

The AMSAT[®] Journal

Editor-in-Chief:
Ed Long, WA4SWJ

Editorial Staff:
John Bubbers, W1GYD
Bill Hook, W3QBC

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March/April 2005



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AMSAT-NA
850 Sligo Avenue, Suite 600
Silver Spring, MD 20910-4730

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Support AMSAT-NA

NOTICE

AMSAT-NA Board of Directors Nominations Due

It is time to submit nominations for the upcoming open seats on the AMSAT-NA Board of Directors. A nomination requires either one Member Society or five current individual members to nominate an AMSAT member for the position. A Director serves for a period of two years. Four Director's terms expire this year; Barry Baines, WD4ASW; Robin Haighton, VE3FRH; Rick Hambly, W2GPS; and Gunther Meisse, W8GSM. Nominations must be in writing, be mailed and arrive no later than June 15th:

AMSAT
850 Sligo Avenue
Suite 600
Silver Spring, MD 20910-4703
Steve Diggs, W4EPI
Corporate Secretary

NOTICE

TAPR Conference Papers

Technical papers are solicited for presentation at the 24th Annual ARRL and TAPR Digital Communications Conference to be held September 23-25, 2005 in Santa Ana, California, and for publication in the Conference Proceedings. Presentation at the conference is NOT required for publication. Papers are due by August 9th, 2005 and should be submitted to:

Maty Weinberg, ARRL
225 Main Street
Newington, CT 06111
or via e-mail to: maty@arrl.org
For more information, see the conference Web page at <http://www.tapr.org/dcc/>
73,
Steve Ford, WB8IMY
ARRL

AMSAT's Mission

AMSAT is a non-profit volunteer organization which designs, builds and operates experimental satellites and promotes space education. We work in partnership with government, industry, educational institutions and fellow Amateur Radio societies. We encourage technical and scientific innovation, and promote the training and development of skilled satellite and ground system designers and operators.

AMSAT's Vision

Our Vision is to deploy high earth orbit satellite systems that offer daily coverage by 2009 and continuous coverage by 2012. AMSAT will continue active participation in human space missions and support a stream of LEO satellites developed in cooperation with the educational community and other amateur satellite groups.





Radio Amateur Satellite Corporation (AMSAT-NA)
 850 Sligo Ave., Silver Spring, MD 20910-4703
 Telephone: 301-589-6062 – Toll Free: 888-322-6728
 Facsimile: 301-608-3410
 AMSAT-NA Club Callsign: W3ZM
 AMSAT-NA Web site: <http://www.amsat.org>

The AMSAT Journal Staff

Editor-in-Chief: Ed Long, WA4SWJ
 (wa4swj@amsat.org)

Circulation: Martha Saragovitz
 (martha@amsat.org)

Editorial Staff:

John Bubbers, W1GYD; Bill Hook, W3QBC

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Editorial Office: Ed Long, WA4SWJ, 26 Broxbourne Drive, Fairport, NY, 14450-1720, e-mail journal@amsat.org, telephone: 262-374-1349. **Advertising Office:** AMSAT-NA Headquarters, 850 Sligo Avenue, Suite 600, Silver Spring, MD 20910-4703.

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The AMSAT Journal staff is always interested in article submissions. Whenever possible, submissions should be sent via e-mail to journal@amsat.org using plain text or word processor files; photos or figures in TIF, GIF or JPEG formats. AMSAT-NA reserves the right to select material for *The AMSAT Journal* based on suitability of content and space considerations. The editors of this publication are volunteers giving freely of their talents, time and efforts to produce *The AMSAT Journal*.

APOGEE VIEW

by Rick Hambly, W2GPS • w2gps@amsat.org



As I write this column there are signs that spring is rapidly approaching here in Maryland. We had a tantalizing few days of warm weather last week and this week is not bad either, for a transplant from the North Country in upstate New York. My first act in preparation for spring was to send my truck's engine heads to the machine shop for a valve job so I'm ready for the drive to Dayton for the annual Dayton Hamvention. I hope many of you are able to attend and I encourage you to spend time at the AMSAT booth renewing acquaintances and meeting your officers and Board members, many of whom will be there. I hope you have also reserved seats at the AMSAT banquet.

I spent the last week of January on a business trip to Germany and Austria. This time I decided to ride the rails instead of renting a car, which turned out to be a wonderful decision. I met new people and avoided the stress of cruising the Autobahn at insane speeds, as I did on my last trip. I spent Saturday, the last full day of the trip, in Marburg Germany dropping in on the last day of the AMSAT-DL P3E satellite design meeting. Fortunately I was able to get a last minute trip report into the delayed Jan/Feb *Journal* but I want to expand a bit on this purpose of this meeting.

AMSAT-NA has published Mission and Vision statements that appear on the inside cover of every *Journal* and on the Web site. A key element is that we plan "to deploy high earth orbit satellite systems that offer daily coverage by 2009 and continuous coverage by 2012." I want to make it very clear that this cannot be accomplished without the successful deployment of AMSAT-DL's P3E satellite and at least two AMSAT Eagle satellites. Because of this, AMSAT-NA has initiated a program to fully support the development of the P3E satellite by maintaining good relations and communication between AMSAT-NA and AMSAT-DL. For example, AMSAT-NA's president has joined AMSAT-DL, apparently the first AMSAT-NA president on record to do that. We are funding and supporting the P3E development work being undertaken in North America by AMSAT-NA developers, which is a significant commitment. This includes hardware, tools and travel related to the IHU3 computer, the Can-Do! satellite bus modules, software development and other items. The P3E satellite is a priority

activity within AMSAT-NA and we need your support and contributions to assure that we can meet our commitments to this project.

Meanwhile, development continues on the Eagle satellite project. We don't have many pictures yet because we have decided to defer the construction of the satellite space frame until we are sure the current design meets our needs. But rest assured, Dick Jansson, WD4FAB, has done a wonderful job in preparing 3-D renderings, mechanical drawings and thermal design and analysis of Eagle's structure so we should be able to build it quickly when the team gives the go-ahead. Meanwhile, with leadership from Bob McGwier, N4HY, and others, we are moving ahead with a new transponder design approach that could revolutionize the way we think of satellite design.

To achieve these goals we need new members, volunteers and money. For example, there will be a modest dues increase as of June 1st, which is explained by Barry Baines, WD4ASW, elsewhere in this *Journal*. You can help by volunteering to set up an AMSAT table at your local hamfest, join the Field Operations team, encourage your ham friends and ham club members to join AMSAT or send an annual contribution to AMSAT. You can even give a presentation at your local ham club. You can join or contribute on the AMSAT Web site store at www.amsat.org or by calling Martha in the AMSAT office at 301-589-6062 (or in the USA call toll free at 888-322-6728). You can get help with presentations and hamfests from Gould Smith, WA4SXM, (wa4sxm@amsat.org), or contact any of your officers or Board members. Please help AMSAT reach its potential. Your efforts are needed now ensure AMSAT's future success.

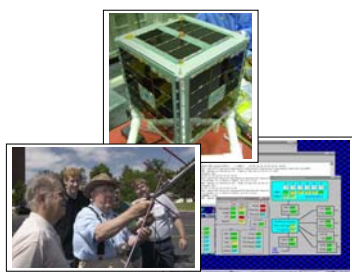
73,
 Richard M. Hambly, W2GPS
 AMSAT President



New Echo Book

AO-51

Development, Operation and Specifications



G. Gould Smith
WA4SXM

A new AO-51 book by Gould Smith, WA4SXM, is now available from the AMSAT office at a cost of \$20. The price to foreign addresses will be slightly higher. This book replaces the original Echo book. It is in color, has 32 new pages (73 total), contains much more information, examples and pictures about AO-51 Operation and Deployment. It also has additional information and photos of the experiments and hardware. Order from Martha at AMSAT Headquarters.

Erratum

In the last issue your Editor mislabeled a caption in Elvin Kingery's article on his trip to Alaska with his wife. He sent me a note that is published below. Sorry for the error Elvin!

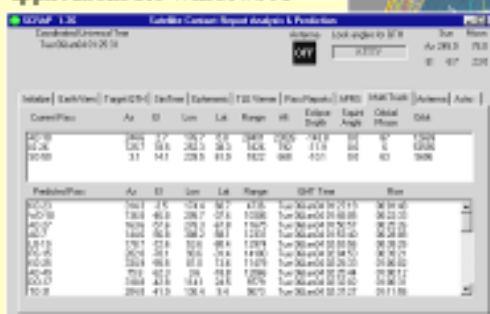
Hello Ed,

The article looked good except for one case. I never referred to using an Arrow antenna in the article and in fact I do not own one. My antenna is home brew and the caption under the picture with Dorothy is not correct. That is not an Arrow antenna, and in fact, is a much better antenna. It will handle a lot more power and does a better job on receive. It was made mostly from old TV antenna elements and lawn chair legs.

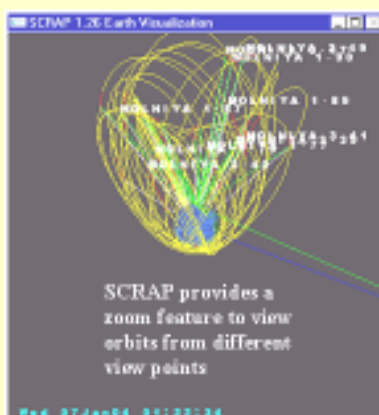
Elvin Kingery, WA4HCT

Satellite Contact Report Analysis Prediction

AMSAT is now the North American distributor of SCRAP, a tracking program designed for ham satellite applications for Windows 95+



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<http://www.amsat.org>

The author, Bill Bytheway, K7TTY donated SCRAP to AMSAT. All proceeds support AMSAT.

Free software upgrades and further information can be found at
<http://www.rtty.com/bytheway>



Due to some ongoing dialog, Barry Baines, WD4ASW, wrote an e-mail on 28 Mar 05 to the AMSAT-BB explaining a number of issues raised in those discussions. His e-mail is published here for readers.

Folks:

During the past several weeks there have been a variety of e-mails sent to the amsat-bb regarding a number of issues such as finances, Eagle support and comments that the BOD members are not 'responding' to queries posted on amsat-bb. As a senior officer and BOD member of AMSAT-NA, I'd like to make some observations and suggestions on these matters.

The question of 'communication' has been raised on amsat-bb several times. In many instances, the originator posts a question and then expects an AMSAT officer or BOD member to respond via amsat-bb to whatever is posted. When a response isn't forthcoming, the originator then claims that the AMSAT senior leadership team is either hiding something or frustration is expressed about lack of communication.

The amsat-bb is a very effective tool for exchanging ideas, passing information and expressing opinions. It is a very ***ineffective*** tool for gaining information from a specific group of people (e.g., the senior leadership team or BOD) for several reasons:

- Not everyone reads amsat-bb.
- Individuals usually don't respond to e-mails not specifically addressed to them.
- Given the nature of the exchanges on amsat-bb, there isn't much encouragement for people to respond.
- Our volunteers who serve in leadership positions devote a significant amount of time to AMSAT. Given lack of time, they will likely focus on issues and concerns that are directly brought to their attention.

As noted above, not everyone in a leadership position (including the BOD) subscribes to amsat-bb. There are a number of reasons why this may be the case:

- Given the amounts of e-mail that individuals receive, not everyone has time to pour through the hundreds of amsat-bb e-mails generated each week.
- The tone of discussions on amsat-bb can cause people to unsubscribe. Frankly,

given the amount of negative comments, personal attacks and emotional outpouring that has come across amsat-bb over time, not everyone is interested in reviewing such postings. Quality of content and courtesy do matter in retaining readership on the amsat-bb.

- There is a real concern about not getting 'drawn into' a series of exchanges that may not be fruitful. Rather than get placed in such a position, the natural reaction is to avoid getting started.
- The availability of the amsat-bb archive on the AMSAT web page does provide a mechanism for people to review postings over a particular period of time (e.g. last 48 hours, last 10 days, etc.). This allows a 'quick scan' of topics without the necessity of actually subscribing to amsat-bb.

Now, it may be that you believe that every BOD member 'should' subscribe to amsat-bb. And perhaps not subscribing to amsat-bb means that a BOD member or senior officer may miss an e-mail exchange that may be useful. Please keep in mind, however, that each individual makes their own determination of how best to use their limited resources (particularly time) to support AMSAT and to fulfill their obligations. Other BOD members or senior officers who do subscribe to amsat-bb will bring to the attention of the appropriate individual(s) particular e-mails if it is felt that such forwarding will be helpful. Having these 'eyes and ears' provide this assistance is one way that the BOD and senior officers help to keep each other informed. Consequently, I don't believe that not having every BOD member and senior officer read every amsat-bb posting has been detrimental to the overall organization.

As noted in earlier amsat-bb postings, the best way to get a response from someone in a leadership position is to follow some general guidelines:

- Address your query to a specific individual. Emily Clarke, W0EEC, has created a means on the AMSAT Web page to post an e-mail to individual BOD members and senior officers. Take advantage of this new tool. Alternatively, send an e-mail to an individual's e-mail alias (such as wd4asw@amsat.org).
- Do not assume that an e-mail sent to 'the world' will get a response. Our volunteers are pretty busy people. If they see an e-mail sent to a group, they will assume that

somebody will answer and of course nobody does. Again, select an individual who you think is in the best position to answer your query and send a note to that one individual. If that person is not in position to address your query, it will be forwarded to someone who can answer you. Take the time to look at the masthead of the AMSAT Journal or the AMSAT webpage (<http://www.amsat.org/amsat-new/AboutAmsat/officers.php>) to see who covers which areas of responsibility.

Again, if you truly want to gain a response or feedback from an AMSAT BOD member or senior officer, take the courtesy of actually addressing your e-mail to the appropriate individual! If you're not willing to address the individual in question, then don't expect someone to respond.

- Keep in mind that the senior officers are responsible for the day-to-day operation of AMSAT while the Board of Directors is responsible for the strategic direction of the corporation, approving the budget and corporate oversight. This means that the senior officers (including the President) implement the policies established by the BOD. Consequently, address your comments to the appropriate area. If you're concerned about the schedule of AO-51, for example, that is not a question for the BOD but the VP-Operations. If you're concerned about *The AMSAT Journal*, that question falls under the VP-Marketing and User Services, not the BOD. However, if you're concerned about the AMSAT budget, the strategic direction of the organization, etc., those are indeed questions that you may want to send to a BOD member.
- Be respectful of others. Again, our volunteers are working hard and don't deserve to get 'hate mail.' If you have a specific question, ask it. Make it simple for the other guy to respond by focusing on only one issue.
- As the majority of our volunteers have day jobs and may have a pile of e-mails to go through, be patient about a response. If you haven't seen a reply in a week, resend your original query. Understand that our volunteers only have so much time per day or per week to devote to AMSAT.
- Use the phone. Most officers and BOD members do not have unlisted phone numbers, so look up their phone number



- on the Web and call at a reasonable hour.
- Take the opportunity to meet with the AMSAT leadership. A number of senior officers and BOD members living in the DC area will be attending the upcoming AMSAT-DC meeting at the Visitor's Auditorium of the Goddard Spaceflight Center, Greenbelt, MD on Saturday, May 14. Information on this meeting can be found in the AMSAT Calendar of Events on the main page of the Web site ("Annual AMSAT-DC Meeting and Space Seminar"). Most of the AMSAT senior officers and BOD members will be at the Dayton Hamvention May 20-22. The upcoming AMSAT Symposium and Annual Meeting in Lafayette, LA the weekend of October 7-9 is a great opportunity to meet the BOD members and senior leadership team as well.

Now, keep in mind that AMSAT has a number of effective communication tools. This includes *The AMSAT Journal*, AMSAT News Service, and the AMSAT Web site. Much of the information that people are asking for can be found in one of these sources. For example, Jim Sanford, WB4GCS, provided a detailed status report on Eagle in the current issue (Jan/Feb 2005) of *The AMSAT Journal*. Has anybody read it? Given that much of Eagle is still in early development, progress is moving at a relatively slow pace at this point in time. Do not expect 'weekly updates' as there isn't much to report. However, Jim does expect to provide updates in each issue of *The AMSAT Journal*. If you are not currently an AMSAT member, here is a good reason to join as membership includes receiving six issues of *The AMSAT Journal* each year. He will also provide a status report during the AMSAT Forum at the Hamvention as one of four presentations being given (Saturday 0815-0945 in Forum Room 1). Details on AMSAT activities at Hamvention can be found on AMSAT Web page. Expect extensive discussions on Eagle at the AMSAT Symposium this Fall.

I authored an article in the same issue on the strategic direction that AMSAT is taking (Mission/Vision) and the focus on HEO satellites. I noted the fund raising issues that we have and the challenge in generating donations needed to fund these projects. Has anybody read it? To my knowledge, I haven't seen one e-mail sent to me in response to that article. Has anyone donated to Eagle this year? Do we all understand that we need

donations in 2005, 2006, 2007, etc. to fulfill the vision of 'daily coverage' by 2009 and 'continuous coverage' by 2012?

The AMSAT Journal previously published the results of the AMSAT Membership Survey. This information is very helpful in looking at trends and expectations of our membership and has been a very effective tool for the BOD. Please note that the survey results have only been distributed through *The Journal*. Over time, we will continue to enhance the quality of *The AMSAT Journal* as exemplified by the outstanding Jan/Feb 2005 issue that arrived in mailboxes earlier this month (another reason to maintain an AMSAT membership). BTW, Ed Long, WA4SWJ, is *The AMSAT Journal* editor and is always looking for articles. Consider whether you have something to contribute towards making *The AMSAT Journal* an even better publication. You can e-mail Ed at wa4swj@amsat.org.

The AMSAT News Service (ANS) continues to provide late breaking news of interest to our membership. For example, did you see last week's posting concerning continuation of kep data distribution? Are you aware of the outstanding work that Ray Hoad, WA5QGD, performed in getting the Air Force Space Command to agree to allow AMSAT to continue to distribute keplerian element data to amateurs and to keep our "Predict" satellite tracking feature in service on the AMSAT website? Because of Ray's diligence and taking the time to develop an effective working relationship with senior officers at AFSC, AMSAT was able to provide input to AFSC concerning the importance of kep distribution to amateur radio operators and explained to AFSC the nature of amateur radios satellite communications. Due to a public law that was passed by Congress last November, it was quite likely that mass distribution of kep data for amateur satellites would have been curtailed if Ray had not taken the lead to work out an arrangement with AFSC. His behind-the-scenes work made a difference.

If you are not currently receiving ANS, please subscribe. You are missing out on an outstanding source of information that is released each week by a team of editors led by Lee McLamb, KU4OS. Go to <http://www.amsat.org/amsat-new/news/> and select "Subscribe to AMSAT New Service" located on the left column of that page. Given your interest in AMSAT and satellites as

exemplified by your participation in *amsat-bb*, I would hope that you'd arrange to receive the weekly ANS Bulletins as well. ANS is available to both members and non-members of AMSAT. The ANS typically sends out two bulletins each weekend: 1) Weekly Satellite Status Report, and 2) AMSAT Weekly Bulletins. Both are valuable resources that provide timely information of interest to satellite users. In my opinion, unless you are receiving these e-mails, you are not keeping yourself informed on the latest activities within AMSAT and the satellite community. You can also submit news to ANS Online by going to <http://www.amsat.org/amsat-new/contact/> and selecting Submit a News Article under Reasons for Contact.

Likewise, the AMSAT Web site hosts a significant amount of 'corporate information' about AMSAT, including audited financial reports and annual reports. As noted in recent *amsat-bb* postings, the "Annual Report 2003" is on the Web site (the 2004 report is currently being prepared). Questions have been raised about how to interpret the numbers. AMSAT follows 'generally accepted accounting principles' and everything is done in accordance with how our auditors have advised us to report our actions. Our books have been audited for more than the last 10 years. We are not hiding anything about our financial condition.

A question has been raised about how to interpret the numbers. Keep in mind that the 2003 Annual Report contains both a Balance Sheet and Income Statement Sources and Uses of Funds for 2002. The former provides an overview of the assets and liabilities of the corporation while the latter details the changes in financial condition. Note that the income statement denotes a negative \$73,009.30, which means that AMSAT spent more money in 2002 than it took in. A significant portion of that was due to expenses associated with the AMSAT-Echo project that year. We have also seen a downturn in total membership, primarily due to people not renewing. I discuss this briefly elsewhere in this issue.

Also posted on the Web site is our Audited Statement for the year 2003 as well as our IRS Tax form for that year. Starting in 2003 AMSAT changed its financial reporting to recognize two important realities:

1. Satellites that are placed successfully in



orbit are not expenses but assets which should be amortized over the useful life of the satellite. Consequently, we are now depreciating that asset over multiple years since satellites (hopefully) are viable operating units with multiple year lives. This change was made to more clearly document AMSAT's fulfillment of our mission and recognize the significant economic value of our assets that we have placed in orbit.

2. A significant portion of AMSAT's mission is enhanced by volunteers who provide hours of In Kind professional services to help fulfill our mission. This includes satellite design, construction and launch operations as well as fulfilling our education mission. Their sweat equity adds significant value to the asset base of our projects. We made this change to properly document an appropriate value of the assets we build as well as be able to demonstrate that AMSAT is indeed expending resources to fulfill our mission and is not simply covering administrative costs.

While it may have been relatively easy to calculate Revenue and Expenses prior to 2003, this simplified approach to accounting did not fulfill several critical needs of AMSAT. Looking simply at cash flows does not provide information that helps to understand AMSAT's overall financial condition. Given that we are now recognizing the importance of our asset base, there are differences in how are financials are measured and reported, which also makes it difficult to compare 2003 results with prior years. However, looking forward to 2004 and beyond, will we be able to make subsequent comparisons due to the consistency of how we deal with assets and volunteer hours.

Since satellites are now considered to be an asset and not simply an expense, there is a big change in our asset base. The end of year net asset amount for 2003 is \$918,299 whereas the amount for 2002 is \$555,085.00. This \$363,144 change in net assets was due to both the change in the value of our financial investments as well as how we now treat satellites as an asset.

The impact of depreciation is now also something to consider and may not be obvious. So, be careful about making year-to-year comparisons of 2003 with prior years.

Members are encouraged to review these documents. All of the reports that are provided are complete and accurate. Please keep in mind that while this information is freely available, please do not assume that our Treasurer or other officers will provide an overview on accounting practices to help you understand how to read a financial statement.

One of the changes that we recently made is an attempt to document In Kind services as well as recognize that when AMSAT builds a satellite, it is indeed an asset that should be amortized over time. Such changes in accounting practices will hopefully more accurately reflect the activities of AMSAT and give potential large donors (who do know how to read financial statements) a better understanding of AMSAT.

Recently there have been a number of comments made about AO-51 and the impact it has had on AMSAT. The BOD made the decision in 2002 to build and launch this satellite for a number of reasons:

- Given the challenges (and disappointments) associated with AO-40, AMSAT-NA needed to get a project started and completed quickly to create future support for the more challenging (and expensive) Eagle.
- The cost of Echo was such that AMSAT could commit to the project without putting the corporation at risk.
- The value of FM satellites to attract newcomers to amateur satellites was demonstrated by earlier FM birds such as AO-27 and UO-14. There were concerns about how long these assets would continue to be available.
- The ability to launch a PBBS-capable satellite to supplement (and eventually replace) UO-22, UO-23, UO-25 was recognized as an advantage.
- Given that the last time AMSAT-NA launched a satellite was in 1990, the BOD felt it was time for AMSAT-NA to take a leadership position in building satellites. (AO-40 was an AMSAT-DL led project that was fully supported by AMSAT-NA.)
- AMSAT-DL was already committed to building P3-Express. Given that the proposed communications suite for Eagle was very similar to P3-E, the BOD felt it might be wise to not concentrate on Eagle until after P3-E was further along in development. This would allow Eagle to benefit from sharing common technology (such as IHU-3 and Can-Do!) as well as

put Eagle in position for launch after knowing what the results were from the launch of P3-E. Subsequently, AMSAT-NA has supported P3-E by covering the expenses of AMSAT-NA members who are involved with the P3-E project because we realize that the success of P3-E will help meet AMSAT-NA's vision.

- At the time of making the decision on AMSAT-Echo, the BOD recognized that Eagle would require major funding. Given the disappointments with AO-40, there were concerns about our ability to raise the funds needed for development and launch at that time.

In my mind, the BOD decision to support AMSAT-Echo over Eagle was both prudent and appropriate. Given the subsequent demise of UO-14 and very limited availability of AO-27, coupled with the loss of the primary 9600 DFM packet birds (UO-22, UO-23, and UO-25), AO-51 has provided an invaluable resource for amateurs worldwide. Given our resources at the time of that decision, it was the right thing to do. In this issue of *The AMSAT Journal* I have an article that includes a discussion of membership counts. AMSAT has seen a continuing flow of new AMSAT members (around 350 per year). However, net AMSAT membership has continued to decline since 1994 because we are losing non-renewing members. This appears to be primarily due to the loss of AO-40. I have prepared a letter that has been mailed to every individual who has not renewed their AMSAT membership in the past year which outlines the changes taking place at AMSAT, highlights our new strategic vision, and asks that person to renew their membership. I am hoping that as more members (and former members) are aware of the direction that AMSAT is taking, that we will see more renewals. AMSAT is not sitting still.

Finally, please recognize that the Board of Directors is fully committed to Eagle. As our vision statement clearly states, the future success of AMSAT is dependent upon creating daily coverage by 2009 and continuous coverage in 2012. These are challenging goals that can only be achieved if everyone helps to support our efforts.

Part of our communications plan for 2005 is to build the membership's awareness of AMSAT's fundamental changes in strategic direction and organizational structure. These were highlighted in the article that appeared in the January/February issue ("This is not



AMSAT Eagle Update

James A. Sanford, PE, WB4GCS, wb4gcs@amsat.org

Eagle Project Manager

Your Father's AMSAT"). To have a successful fundraising effort for Eagle, we first must build a case for support. We must gain the support of our membership that we are taking the right steps and that everyone must come to the realization that we need everyone's financial support if we are to raise the funds that are so vital for a successful project. Once we have taken the time to build membership awareness and provided the case for support, then the formal fund raising campaign will begin in earnest. Our goal is raise \$100,000 in 2005, so it certainly isn't too soon to make your contribution toward supporting Eagle in 2005.

I hope that you have found these comments helpful. Our volunteers who serve as BOD members, Senior Officers and officers of AMSAT are dedicated to fulfilling AMSAT's strategic goals. We are mindful of the need to communicate, which we have done primarily through *The AMSAT Journal*, AMSAT News Service, and AMSAT Web site. Members of our leadership team will be available to meet with you at several upcoming major functions such as AMSAT-DC meeting and Hamvention. We answer e-mail when such e-mail is in-fact addressed to a specific individual. Please consider how YOU might help AMSAT to fulfill it's potential by your personal volunteering of time, treasure and talent. If you are a subscriber to amsat-bb and are not a current AMSAT member, please get on our Web site (www.amsat.org) now and become a member!

Regards,

Barry A. Baines, WD4ASW

VP-Marketing & User Services and BOD Member

AMSAT-NA 

Our Vision is to deploy high earth orbit satellite systems that offer daily coverage by 2009 and continuous coverage by 2012...

Eagle design work continues, as does some real work on real hardware. This issue, I've included a few photos of things going on.

Chuck Green reports that many of the Can-Do! modules are being finalized for flight in P3E – a process identical to what more of these will go through for Eagle. Photo 1 shows a module after preparation by applying a tantalum shield. Photo 2 shows a few modules in a vacuum after application of the conformal coating. The whole issue of a conformal coating is actually very interesting. First the conformal coating (it is called Uralane and is space qualified) is mixed; it's a two part product. Then it is placed in a vacuum chamber to remove bubbles, even really small ones. Then it is brushed onto the device being coated. Then the devices are put back in the vacuum chamber to remove trapped bubbles. *So, why do we need a conformal coating?* It's just a precaution. Hopefully it is not needed. But it is a form of insurance. It insulates all exposed electrical surfaces, holds parts in place really well, keeps coils from humming and seals aluminum electrolytic capacitors. It never gets completely hard so does not induce stress with thermal cycling.

Remember that the Can-Do! modules are shared with AMSAT-DL's P3E, as is the IHU-3. This teaming effort will maximize our collective experience, test results and peer review. When Eagle flies, her internal communications modules and brain will have been thoroughly examined by many smart people and already tested in P3E. This

teaming effort is a win-win for both organizations.

Dick Jansson advises me that the "collection of CAD drawings" I mentioned last issue is actually a DETAILED SET OF DRAWINGS FROM WHICH WE COULD START BUILDING STRUCTURE TODAY. We've chosen not to, for a couple of reasons. We really want to peer review the design (like all other aspects of Eagle) and more importantly, it may yet change due to mission requirements we don't yet know. The important thing to remember is that, a LOT of work has been done on the structural design and we are positioned to move quickly once details of the payload and mission are settled. Photo 3 shows the structural INTERNALS as currently modelled. Note the room for central propulsion, which we will need, and all the area available for mounting standard modules.

Software defined radio (SDR) studies continue. Bob McGwier keeps sending me pointers to some of the things going on in the world of SDR and it's overwhelming. This is a subject in which I'd personally like to play! Do a Google on "software defined radio" and go have dinner. Plan on spending the rest of the evening learning. This is good stuff. And it's going to do good things for Eagle.

The Eagle team has just learned of a new launch organization/opportunity possibility. It may not work, but we're looking at it – networking continues!

Ken Ernandes reports that we've recently learned of a possibly available propulsion unit for Eagle. We think it will be sufficient for our needs, but we are continuing to look at other options. Ken is continuing to look at orbital parameters and it now looks like we'll have a decent period of time after launch before we MUST do our perigee-raising burn. This is important, because it gives us time to establish and verify communications, function and orientation before we expend our finite supply of energy adjusting the orbit. I'm staying away from any numbers because the analysis continues. The point is that in the WORST CASE we'll have time to assess and orient before committing to a new orbit.

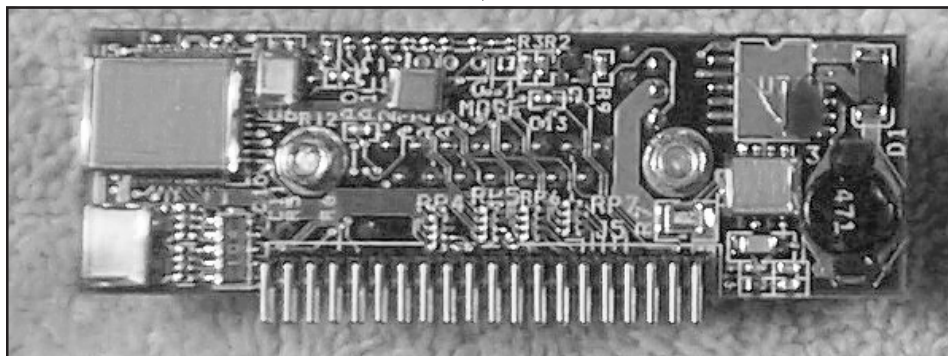


Photo1: Can-Do! Module prepared for flight.

I've just learned about a volunteer who brings considerable RF and PC-board expertise to the project. This is what we need, volunteers! We're still looking for:

- cash (look at the Web site!)
- an experienced microwave RF designer and tools
- peer reviewers in any area
- some folks to work on structure and thermal issues with Dick Jansson

Regarding the last point, AMSAT President, Rick Hambly, is very interested in cultivating long-term relationships between AMSAT and universities. If you have a connection, or know somebody who does, please contact Rick or myself. These relationships present an opportunity to enrich AMSAT and our society by sending some graduate engineers out into the world with some experience, enthusiasm and a sense of accomplishment.

I look forward to seeing you at Dayton.

As always, comments and questions to: wb4gcs@amsat.org 🌐

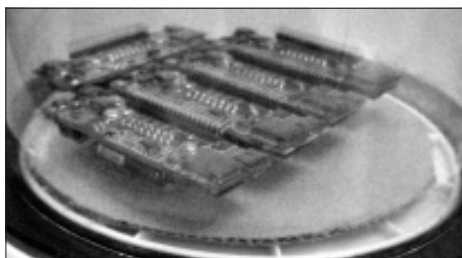


Photo 2: Can-Do! Module being tested in a vacuum chamber.

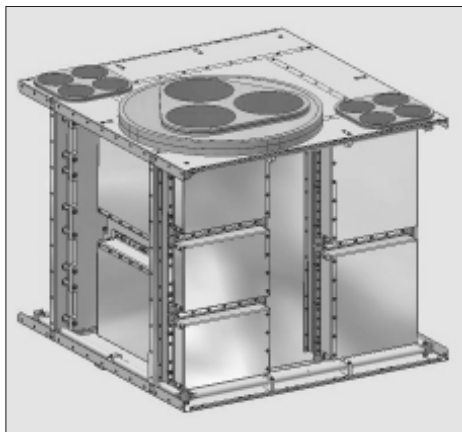


Photo 3: Eagle Assembly.

SPACE PROJECT CAMÔES

A joint working meeting between the executive directors and engineers of AMRASE (AMSAT-BR in Brazil) and AMRAD (AMSAT-CT in Portugal) was held at the Aerospace Observatory in Oeiras, Portugal on 12 February, 2005. On the agenda were lengthy discussions on a set of technical and engineering subjects relative to education, engineering development, satellite construction, experiments and educational programs for amateur and student satellites with specific goals for development. This joint effort began in Brazil and Portugal in mid-2004.

This latest meeting resulted in the establishment of "Space Project CAMÔES", a joint education partnership established between AMRAD and AMRASE. This project has, among others, objectives for cultural and engineering cooperation for the construction of satellites for the Amateur Radio service.

Tadeu Fernandes, PY1KCF, president of AMRASE, gave a detailed presentation of the Brazilian organization, with AMRASE being identified as a pioneering organization in South America exclusively dedicated to education, research and aerospace experimentation. Additional goals are to

promote awareness by academic and professional organizations by training and developing skills and techniques of students seeking their first job in aerospace. The objectives of AMRASE are similar to the efforts of AMRAD, which also seeks international cooperation for the construction and exploration of remote and manned satellite experiences through cooperation with AMSAT and ARISS.

In these terms AMRAD and AMRASE agreed that the efforts to achieve their goals increasingly depend upon and benefit from cooperation between Portugal and Brazil. Brazil, by promoting this initiative of cooperation and AMRAD in full agreement, acknowledge that success will include reaching out to member countries of the CPLP (Community of Portuguese Language Countries) to develop the largest possible number of participating education programs and development of professional programs in the Portuguese language.

Mariano Gonçalves, CT1XI, president of AMRAD, characterized the objectives of this education program to "develop one common space project in Portuguese language that will support engineering and cooperation with AMSAT", which has

continued next page ...

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Emily travels the West.



AMSAT's Web Master, Emily Clarke, W0EEC, recently took a trip through the wild West visiting friends and working the birds. At top she is at the Grand Canyon. What a beautiful site to operate from. And what beautiful sights! Below, Emily is operating from the Salton Sea in California. The Salton Sea is the largest lake in California and is an average of 227 feet below sea level!

Space Project CAMÔES continued ...

constructed and launched more than 30 satellites since 1970. Both Tadeu and Mariano indicated that the goal should be to develop integrated programs of education and engineering, that will partner different organizations, educators, and professional mentors with polytechnical schools, universities and other organizations to research several satellite designs initially using high altitude balloons. The final goal will be to develop and launch into Earth orbit at least one amateur satellite. This program has been affectionately given the name the "Space Project in the language of Camões and Jorge Amado".

[Luis Vaz de Camões (1524-1590) is Portugal's most beloved poet. Jorge Amado (João Amado de Faria - 1912-2001) is the most popular 20th century Brazilian novelist.]

Both AMRAD and AMRASE are non-governmental organizations that have a mission of developing and cooperating in international amateur space exploration in partnership with AMSAT (The Amateur Radio Satellite Corporation) and receive additional support from ESA, NASA and Energia Russia.

Oeiras, 12 February, 2005 ☾

AMSAT is the North American distributor of **SatPC32**, a tracking program designed for ham satellite applications. For Windows 95, 98, NT, ME, 2000, XP.

Version 12.2 now supports Labjack U12 and W0LMD rotor controllers and Doppler tuning for Yaesu FT-817/857/897.

Features:

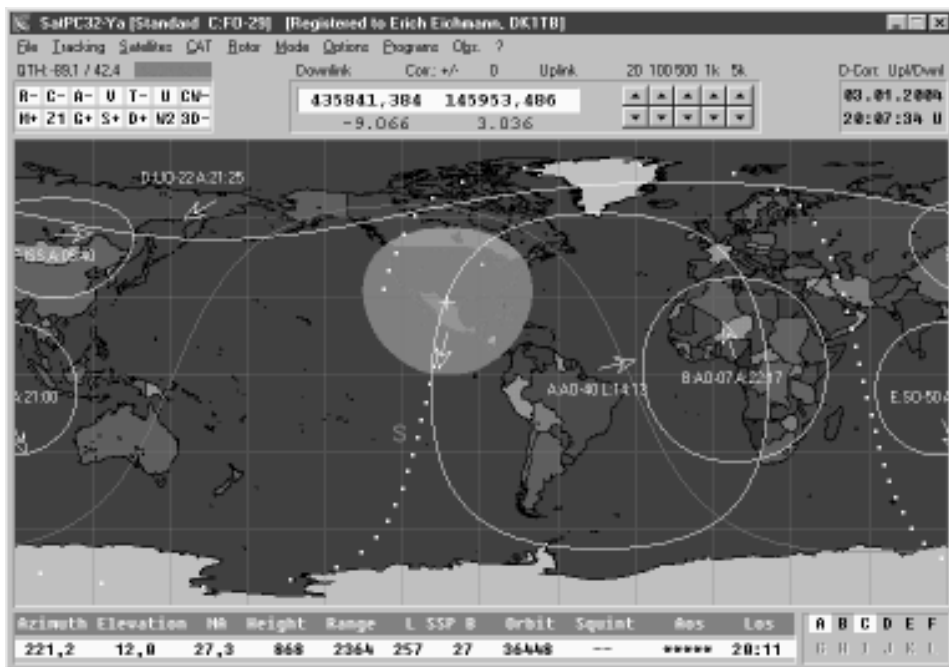
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- Doppler tuning with on-screen frequency displays. Radio models supported: Yaesu FT-847, FT-736R, FT-817, FT-857, FT-897 ICOM IC-820H, IC-821H, IC-910H and other ICOM radios Kenwood TS-790 and TS-2000 DDE client programs
- "Transparent" VFO-knob tuning in addition to keyboard and mouse tuning.
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- Includes a non-graphical version and programs that output lists to the screen, printer, or a file.
- Interfaces with WiSP, with user-defined satellite switching priority.

Price is \$45 for AMSAT members, \$50 for non-members, postpaid on CD-ROM.

A demo version may be downloaded from <http://www.dk1tb.de/indexeng.htm> A registration password for the demo version is \$40 (members), \$45 (non-members).

Order by calling 1-888-322-6728, or use the online shop at www.amsat.org.

The author DK1TB donated SatPC32 to AMSAT. All proceeds support AMSAT.



Dayton Hamvention 2005

The Dayton Hamvention 2005 will be held this year on 20 through 22 May 2005. This year is the 75th anniversary of the Dayton Amateur Radio Association, sponsor of Hamvention, and the 90th anniversary of the ARRL. In conjunction with Hamvention 2005, the ARRL will be holding their national convention in Dayton. It is anticipated that the attendance for Hamvention will be larger in 2005 than in previous years. Make your reservations early for all AMSAT activities!

As has been the case for the last several years Hamvention will be at the Hara Arena Complex on the north side of Dayton. Further information on Hamvention 2005, including advance ticket sales and motel accommodations, can be found at www.hamvention.org.

AMSAT has a block of rooms reserved at the Hampton Inn in Fairborn. Please contact Martha (martha@amsat.org) at the AMSAT office for room price and availability for Hamvention. The phone number for the AMSAT office is 301-589-6062. Priority for rooms will be given to those who are willing to work in the AMSAT booth for two 2-hour shifts during Hamvention. Other hotels in the immediate area of the Hampton Inn include the Fairfield Inn, Ramada Inn, Fairborn Holiday Inn, Red Roof Inn and the Homewood Suites if additional accommodations are needed.

If you are eastbound on Col. Glenn Hwy turn right on the road between the Taco Bell and Bob Evan's Restaurant. Proceed through the 4 way stop and the motel is on the left-hand side at the end of the road. There are several local restaurants in the shopping area in front of the motel and about 1 mile away at the Fairfield Commons Mall. The GPS coordinates are listed below.

Again this year the Upper Valley ARC has given AMSAT permission to use their repeater system (call is N8GTE) during Hamvention. The 2-meter repeater is on 145.41 - .6 MHz with a PL tone of 118.8 Hz. There is an UHF repeater (call N8GTE) available on 442.375 +5.00 MHz with a PL tone of 118.8 Hz. These repeaters are within a mile of the AMSAT hotel site. Reception of the repeater between the Hamvention site and the motel is possible on either repeater.

Thursday, 19 May 2005

Thursday morning there will be a group that sets up the booth for AMSAT at Hamvention.

If you are interested in being a volunteer please contact Barry Baines at wd4asw@amsat.org. Barry will also be taking names for those who wish to work in the booth during Hamvention.

The Fourth Annual AMSAT "Pizza n' Suds" party will be held again this year at Marion's Pizza at 1320 North Fairfield Rd. The party will begin at 6:30 PM and go until the crowd disappears. Individuals may order their food from the menu and drinks (beer, wine, sodas and iced tea) are available at the bar. Directions and coordinates are listed below.

The party is open to all hams that are interested in amateur satellites. Come on in and make friends with some new hams. This is an excellent opportunity to have an eyeball QSO with some of the AMSAT satellite designers and officers in a relaxed and informal atmosphere.

Last year's event was well attended with over 60 satellite enthusiasts at the party. If you plan to attend please contact Dave Misek, N8NPX, in advance at n8np@arrl.net and let him know how many will be in your group. We have 120 seats reserved for the party.

Driving Instructions to Pizza 'n Suds

From the Hampton Inn go to Col. Glenn Highway and turn right. Go approximately 1/8 mile to the intersection with N. Fairfield Rd and turn right and head south 3.7 miles. When you cross Old Route 35 you will see a shopping center on the left-hand side. At the intersection of N. Fairfield Rd and old state Rt. 35, there is a Sunoco gas station on your left and a Friendly's restaurant across the street. Marion's is directly behind the Friendly's restaurant. Go through the intersection and turn left into the shopping center. Marion's Pizza is on the left and slightly up hill as you make the turn.

From the downtown Dayton area follow US Route 35 East toward Xenia. Exit at North Fairfield Rd. and go north about 0.7 of a mile and turn right into the shopping center. Marion's will be on the left-hand side and slightly up hill as you enter the shopping center. APRS users should look for N8NUY-10 as a beacon. The coordinates for Marion's Pizza are listed below.

Friday, 20 May 2005

Hamvention begins at 8:00 AM in the flea market (a.k.a. outside vendors). Doors open at 9:00 AM for the inside exhibits and Friday technical sessions. The Hara Arena complex closes at 6:00 PM. AMSAT will once again

by Barry Baines, WD4ASW

be located in booths 445-448 in the Ballarena.

The AMSAT banquet will be held Friday evening at 6:00 PM. A happy hour will be held until 1930 and there will be a COD bar. This year there will be appetizers served at the bar starting at 6:30 PM for those who attend happy hour! Again this year, the buffet banquet will be held at the Amber Rose Restaurant at 1400 Valley St. in old north Dayton. Maps/directions to the AMSAT Banquet from Hara Arena will be available at the AMSAT booth. As in past years the meal will be a buffet. Dinner will be served at 7:30. Price for the dinner is \$27.50 per person and includes appetizers, salad, meal and desert, tax and gratuity. Coffee, tea and iced tea are included. Wine, beer and mixed drinks are available at the COD bar.

Reservations are required and the banquet is strictly limited to 90 people maximum. Please contact Nancy Makley, kc8gyw@amsat.org, for reservations prior to Thursday, 19 May. Please list the name and call of each person who will be attending. Presidents Club Gold members should tell Nancy if you are attending the banquet. Please pay at the door as you enter the second floor banquet room. Cash, AMEX, Discover, Dinners Club, Visa or Master Card may be used to for payment. Note: Late reservations (if available) may be made until 1430 Friday only at the AMSAT booth.

Saturday and Sunday, 21-22 May 2005

Volunteers for the 8:00 AM time period at the AMSAT booth should be in place and ready for the crowd. Hamvention is open inside from 8:00 AM to 5:00 PM on Saturday.

The Sunday hours are from 8:00 AM to 1:00 PM except for the main arena where there will be presentations for this year's Hamvention Award Winners. The arena closes following the drawings for unclaimed prizes and the grand prizes.

Teardown of the AMSAT booth will begin promptly at 1:00 PM.

AMSAT Forum

The AMSAT Forum will be held from 8:15 to 9:45 AM in Forum Room 1. The following speakers are confirmed as of mid-March:

Moderator: Barry Baines, WD4ASW, VP-Marketing & User Services, AMSAT-NA

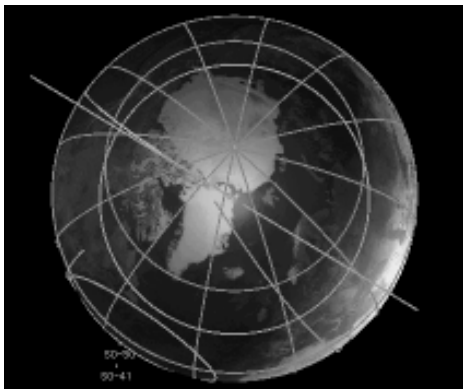
- Rick Hambly, W2GPS, "AMSAT's Mission and Vision"

continued on page 13



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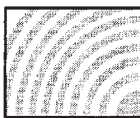
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Oscar Echo PSK 31

Thomas Lubbers, K8TL, k8tl@earthlink.net

Since I claim to operate on all bands from DC to light and all modes, when I saw PSK-31 on the schedule for AO-51, I decided to give it a try. I have been using PSK-31 for a few years and have been on the satellites since the final days of Oscar 8, so it didn't look like too difficult a challenge. It has been a while since I had done any 10-meter satellite work. This would be the first time I used 10 meters as the uplink.

The preparation required some juggling of assets. My primary satellite transceiver is now the IC-910, which doesn't cover 10 Meters. I have the FT-847 that had been relegated to spare status and mobile operation. Since the IC-910 and FT-847 handle PSK a bit differently I built a new interface and rerouted some coax. I didn't think it would take long but even starting over a week in advance I installed the last coax connector Tuesday after noon.

As far as I know there were no completed QSO's however there were some minor successes. I made some wrong assumptions and one downright blunder. I copied 2 stations not counting myself and received reports that I was heard by 3 different stations.

The worst assumption was that I could keep track of the uplink transmit by hand as I did in the old RS days. For the uplink I had a beam and vertical available. On the old mode "A" birds 10 meters was the downlink and the fading signal gave you the hint that it was time to move the antenna or try the other one. With 10 Meters as the up link it isn't that easy. Measuring the strength of the downlink isn't helpful either. The only thing that affects the "S" meter on the downlink is the pointing of the 70 cm antenna. With the FM downlink your signal has nothing to do with the strength of the received signal. You could get an indication of your signal strength by looking at the trace on the waterfall but that would require duplex PSK-31.

With PSK-31 on HF I sort of fell into the habit of using the SSB, 2.7 kHz filter. Displaying the waterfall from 0 to about 3 kHz was sufficient. On HF SSB AFSK style you could retune the transceiver a bit to center the activity. There are two traps with that mindset. First retuning the receiver doesn't move the location of the signal on

the waterfall; it is FM. Second, you are listening to FM and not using that SSB filter. You can and should display at least 4 kHz of the waterfall!!!

I don't know what the others were doing, but I suggest we use the convention we did with the first analog transponders. Set the transmit frequency and tune only the receive. By this I mean the audio component. This can be done in Digipan by using the dual channel mode. That's the same one you use when the guy wants to work split.

Here is a blow-by-blow description of how it went.

Orbit 3720. At AOS I heard several stations exchanging grid squares. I heard my downlink but since Digipan isn't duplex, I couldn't copy it.

Orbit 3721. More phone signals. I heard my downlink. I heard at least one other warble but saw nothing on the waterfall.

Orbit 3722. Played around with the transmitter set frequency trying to find optimum spot. I never contemplated receiving PSK31 on FM so was slow to realize that tuning the downlink didn't affect where the signal appeared on the waterfall! I received email from KA8HQL and N5UXT that they had copied my signals. I set up a second computer and the IC-910 so I could do full duplex.

Orbit 3728. I printed my downlink and W1AW's CQ. I could hear W1AW's warble but there was nothing on the waterfall. I finally found the signal at about 4 kHz on the waterfall. I left my transmit frequency alone and called W1AW but no answer.

Orbit 3729. Copied my signal, W1AW and W5KSI. Both very far up the waterfall, between 3 and 4 kHz. Answered then without intending to move the transmit frequency, which was showing up at about 1 kHz on the waterfall. Since I had been exchanging e-mail with N5UXT/W5KSI, I spent most of the orbit calling them. That wasn't working so I tuned back to W1AW and was certain I saw fragments of my call. I had clicked on their signal which moved my transmit frequency. My signal disappeared from the waterfall DUH! I tried peaking the uplink antenna and things went downhill from there.

One of the big benefits I can see for this mode is more than one contact at a time as

opposed to the bent pipes.

My suggestions for better success the next time around:

- Use the Dual Channel mode on Digipan and leave the transmit frequency.
- Set your waterfall to cover at least up to 4 kHz.
- Beg or borrow a second computer so you can copy your downlink.

There are two things that would be handy by the next test:

- A full duplex version of PSK-31 software.
- Knowledge of the uplink frequency that would cause the up and down audio to match. I intend to figure that out on the first orbit the next time. In the meantime, lock down the transmit audio frequency and tune to the receive audio. 📡

Hamvention ... continued

- Jim Sanford, WB4GCS, "Eagle Project Update"
- Sam Jewell, G4DDK, "An Update on SSETI Express Student/AMSAT-UK Satellite"
- Frank Bauer, KA3HDO, "Human Spaceflight Update (ARISS & Future Exploration Initiatives)"

Special emphasis will be made on the status of new satellite projects such as SSETI Express and Eagle, which is currently under design. The session is always standing room only. Get there early and grab a good seat! Enjoy Hamvention the remainder of Saturday and Sunday!

Longitude and Latitude for APRS/GPS users:

Hampton Inn

39 deg 46' 37.8" N

84 deg 03' 16.8" W

Marion's Pizza Beavercreek

39 deg 43' 35.6" N

84 deg 03' 21.8" W

Amber Rose

39 deg 46' 54.8" N

84 deg 09' 29.4" W

Hara Arena Complex

N 39 49.223

W 84 15.335 📡



2005 AMSAT Field Day Competition

It's that time of year again; almost summer and Field Day! Each year the American Radio Relay League (ARRL) sponsors Field Day as an emergency preparedness exercise. The event takes place during a 24-hour period on the fourth weekend of June. For 2005 the event takes place during a 27-hour period on the fourth full weekend of June, from 1800 UTC on Saturday June 25, 2005 through 2100 UTC on Sunday June 26, 2005. Those who setup prior to 1800 UTC on June 25 can operate only 24 hours. The Radio Amateur Satellite Corporation (AMSAT) promotes its own version of Field Day for operation via the amateur satellites, held concurrently with the ARRL event.

If you are considering ONLY the FM voice satellites like AMRAD-OSCAR-27, SaudiSat-Oscar-50 or AMSAT-OSCAR-51 for your AMSAT Field Day focus, don't, unless you are simply hoping to make one contact for the ARRL rules bonus points. The congestion on FM LEO satellites was so intense in 2004 that we must limit their use to one-QSO-per-FM-satellite. This includes the International Space Station. You will be allowed one QSO if the ISS is operating Voice. You will also be allowed one digital QSO with the ISS or any other digital, non-store-and-forward, packet satellite (if operational).

The format for the message exchange on the ISS or other digital packet satellite is an unproto packet to the other station (3-way exchange required) with all the same information as normally exchanged for ARRL Field Day, i.e. e.g.:

W6NWG de KK5DO 2A STX
KK5DO de W6NWG QSL 5A SDG
W6NWG de KK5DO QSL

If you have worked the satellites on Field Day in recent years, you may have noticed that a lot of good contacts can be made on some of the less populated, low-earth-orbit satellites like Fuji-OSCAR 29 or AMSAT-OSCAR 7. During Field Day the transponders come alive like 20 meters on a weekend. The good news is that the transponders on these satellites will support multiple simultaneous contacts. The bad news is that you can't use FM, just low duty-cycle modes like SSB and CW.

THE 2005 AMSAT FIELD DAY RULES

The AMSAT Field Day 2005 event is open to all Amateur Radio operators. Amateurs are to use the exchange as specified in ARRL

rules for Field Day. The AMSAT competition is to encourage the use of all amateur satellites, both analog and digital. Note that no points will be credited for any contacts beyond the ONE allowed via each single-channel FM satellite. Operators are encouraged not to make any extra contacts via these satellites (Ex: AO-27 & SO-50). CW contacts and digital contacts are worth three points as outlined below.

1. Analog Transponders

ARRL rules apply, except that:

- Each phone, CW, and digital segment ON EACH SATELLITE TRANSPONDER is considered to be a separate band.
- CW and digital (RTTY, PSK-31, etc.) contacts count THREE points each.
- Only one contact is allowed via each single-channel FM satellite, AO-27 (1 phone), SO-41 (1 phone), SO-50 (1 phone), AO-51 (1 phone regardless of mode; PBBS-see Pacsats below), ISS (1 phone and 1 digital), PCSat (I, II, etc.) (1 digital), etc.
- The use of more than one transmitter at the same time on a single satellite transponder is prohibited.
- Each satellite transponder is considered a separate band. Phone QSO's count for one point, other QSO's (CW, RTTY, PSK31 etc) count for three points.

2. Digital Transponders

For the Pacsats (LO-19, e.g., GO-32, AO-51, etc.) or 'Store and Forward' hamsats, each satellite is considered a separate band. Do not post "CQ" messages. Simply upload ONE greeting message to each satellite and download as many greeting messages as possible from each satellite. The subject of the uploaded file should be posted as Field Day Greetings, addressed to ALL. The purpose of this portion of the competition is to demonstrate digital satellite communications to other Field Day participants and observers. Do not reply to the Field Day Greetings addressed to ALL.

The following uploads and downloads count as three-point digital contacts.

- (a) Upload of a satellite Field Day Greetings file (one per satellite).
- (b) Download of Satellite Field Day Greetings files posted by other stations. Downloads of non-Field Day files or messages not addressed to ALL are not to be counted for the event. Save DIR

by Bruce Paige, KK5DO

listings and message files for later "proof of contact."

Please note that AMSAT uploaded messages do not count for QSO points under the ARRL rules. Satellite digipeat QSO's and APRS short-message contacts are worth three points each, but must be complete verified two-way exchanges. Remember, only one digipeat contact is allowed for the ISS and other satellites in this mode.

The use of terrestrial gateway stations or Internet gateways (i.e., EchoLink, etc.) to uplink/downlink is not allowed.

If FO-29 is active, the JA transponder can be used for analog CW and phone activities under the analog transponder rules, and the JD system can be used as a separate transponder under the digital rules.

Sample Satellite Field Day Greetings File:

Greetings from W5MSQ Field Day Satellite station near Katy, Texas, with 20 participants, operating class 2A, in the AMSAT-Houston group with the Houston Amateur Television Society and the Houston QRP club. All the best and 73!

Note that the message stated the call, name of the group, operating class, where they were located (the grid square would be helpful) and how many operators were in attendance.

3. Operating Class

Stations operating portable and using emergency power (as per ARRL Field Day rules) are in a separate operating class from those at home connected to commercial power. On the report form simply check off Emergency or Commercial for the Power Source and be sure to specify your ARRL operating class (2A, 1C, etc.).

AND FINALLY...

The Satellite Summary Sheet should be used for submission of the AMSAT Field Day competition and be received by KK5DO by midnight July 18, 2005. The preferred method for submitting your log is via e-mail to kk5do@amsat.org. You may also use the postal service but give plenty of time for your results to arrive by the submission date. Add photographs or other interesting information so that can be used an article for the *Journal*.

If mailing your submission, the address is:

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AMSAT Dues Changes and Membership

Barry A. Baines, WD4ASW, wd4asw@amsat.org
VP-Marketing & User Services

The AMSAT Board of Directors has voted to increase AMSAT domestic membership dues to \$44.00 from the current \$39.00 effective June 1, 2005. This 12% increase follows a \$3.00 increase that took effect on January 1, 2004. Life membership is also increased accordingly, to \$880 (20x annual membership). Family membership will continue to be 1/2 the regular membership, or \$22.00 per family member. (Family membership is contingent upon a regular or life member residing in the same household).

Those who join AMSAT or renew their current membership prior to the end of May can do so before the price increase. Early renewal is encouraged. The old membership dues will also be honored at the upcoming Dayton Hamvention (May 20-22).

Why did the Board make this decision?

The BoD is responsible for maintaining the financial integrity of the organization, ensuring that AMSAT is focused on fulfilling the organization's Mission and achieves the Vision that has been set for AMSAT. A key component is stewardship of the financial health of the organization and to ensure that not only is AMSAT able to maintain the financial reserves necessary to protect the organization, but also recognize the absolute necessity for greater cash flow needed to accomplish the Vision. We must recognize that AMSAT's ability to achieve success can only be accomplished if the membership is willing to actively support the organization. That support is not only reflected in membership dues, but also with additional donations targeted to support the various projects that AMSAT is committed to complete. Membership dues don't provide the capital needed to finish these projects, but it does provide the financial foundation for the organization as well as the enthusiastic and vibrant base for support so necessary for future success.

The BoD discussed a dues increase proposal vigorously prior to making a decision. A review of the 2005 Budget made it clear that in order to ensure a balanced budget that also achieved our 2005 Goals, a dues increase is warranted. In addition, AMSAT must raise over \$100,000 to cover Eagle and Phase 3 Express expenses for 2005.

AMSAT is embarking on a challenging and exciting time. As noted in the previous issue of *The AMSAT Journal* as well as elsewhere, there are a number of projects and activities that reflect this trend:

- The successful launch and commissioning of AO-51 (Echo)
- AMSAT's support for AMSAT-DL's Phase 3 Express Project
- Eagle is now in preliminary development
- Progress is being made on SuitSat as part of the ARISS team's support of human spaceflight.

Organizationally, AMSAT has seen significant improvements in a number of areas:

- The new AMSAT Web page has been warmly received
- The new AMSAT Store on the Web page is very successful in generating revenues
- Efforts are being made to improve our management information systems which will hopefully translate into more effective fund raising as well as permit AMSAT to introduce a member services function on our Web site.
- Our volunteers in Field Operations are now using the Field Operations Support System (FOSS), which includes presentation and support materials for our Area Coordinators.
- *The AMSAT Journal* continues to be the premier magazine devoted to amateur satellites. The quality and scope of articles coupled with contributions that cover all facets of our hobby are truly impressive.
- The AMSAT News Service (ANS) continues to expand its coverage and quality of news information.
- New Contest & Awards opportunities exist, such as "51 on 51".
- AMSAT is now measuring volunteer hours through the Volunteer Reporting System that is used in our financial reports (In Kind Services) and helps document to potential donors the amount of "sweat equity" invested in AMSAT. This information is now incorporated into our fundraising efforts and our Annual Report.

This is by no means a comprehensive list, but hopefully you'll agree that AMSAT deserves your active support as a member and volunteer. Clearly, AMSAT is not sitting

still.

Despite the significant accomplishments of AMSAT over the past few years, membership has indeed declined since 1994 when membership peaked at about 8,000. Our current membership is around 3,700 with about 1,700 being Life Members. As noted in the membership survey results that were published in the September/October 2004 issue of *The AMSAT Journal*, about 28% of our members have been part of AMSAT for less than five years. This means that the vast majority of members have been part of AMSAT for six years or longer. While we continue to gain about 350 new members per year, we have lost a significantly higher number of regular members who elected to not renew resulting in an overall reduction in the membership base. This reduction in membership (and the resulting decline in membership dues receipts) is one reason for the dues increase. The BOD believes that the small increase in membership dues will result in greater revenue to support AMSAT. In other words, while some current members may decide to not renew at the new membership dues levels, we are hopeful that enough current members will renew and new members will join that will result in overall increase in cash flow to AMSAT.

All AMSAT members are encouraged to help recruit new members. Talk to your friends, local ham club members and acquaintances about what AMSAT is doing. Take the time to share your enthusiasm about AMSAT with others. Consider a family membership for your significant other. The most effective way to build AMSAT membership is to have current members encourage others to join.

Finally, as noted the January/February issue of *the AMSAT Journal*, our success in achieving our Vision is dependent upon changing the paradigm that we have within AMSAT. We must realize that AMSAT needs significant amounts of cash to be able to build High Earth Orbit (HEO) satellites and place them in orbit. Our ability to provide continuous coverage by 2012 is dependent upon having these assets in orbit. Those of us who embrace AMSAT's Vision must take personal responsibility for helping to provide the financial resources that are vital for AMSAT's future. Active membership is one aspect of that commitment. ☸



Amateur Satellite Launch Vehicles

G. Gould Smith, WA4SXM, wa4sxm@amsat.org

This is the concluding part of the series on amateur satellite launches. I will talk about the variety of launch vehicles (LV's) available to carry satellites aloft and a number of the factors used to determine which launch vehicle will best fit the payload and the budget. The same launch vehicle will achieve different orbits when launched from a different launch site. The orbit into which the launch vehicle deploys the satellite determines either its operating ability in that orbit or its ability to change to a more favorable orbit given enough fuel. The theme that has tied all three of these articles together is ENERGY.

In the first segment on launch sites we talked about how important the location of the launch site was to maximize energy usage. The goal is to get the largest payload into the highest orbit and the selected inclination. Part Two discussed the huge energy needs to modify the orbit of a satellite after being released from the launch vehicle. This is a crucial factor for most commercial satellites. Every bit of energy that the satellite must burn to get into its planned orbit means that much less energy is available to maintain its position and therefore shortens the revenue producing lifetime.

To meet the budget requirements of many satellite customers, many types of launch vehicles/rockets have been designed. The traditional trade offs for launch vehicle designs are: 1) payload weight vs. 2) altitude vs. 3) orbit. The more you change one, the more you affect the other two. The majority of fuel is consumed in getting the launch vehicle a few thousand meters off the ground. The larger the launch vehicle the more fuel it must lift; the more weight it must lift the more fuel it requires; eventually it approaches a diminishing return.

Single stage rockets by necessity are small and can only put small masses into orbit. Multi-stage launch vehicles allow stages to be released at a planned time during the flight sequence. This allows the next propulsion event to have a great deal less mass to propel, thereby maximizing the effectiveness of energy usage. The trade off for this method is complexity. The fact that there are more parts, engines, types of fuel and engine starts means an increased opportunity for failure. The European Space Agency (ESA) instituted a new launch

vehicle design to convert to a two-stage Ariane 5 launch vehicle to replace the trustworthy, three-stage Ariane 4 series. This was done to be competitive, carry more mass, as well as to reduce complexity in the launch vehicle.

How much power does it take to launch a satellite?

According to Strong, 97% of the total launch mass is fuel. This leaves only 3% of the liftoff mass for the rocket itself, the satellite and its container.

$$DV = U \ln(M_i/M_f)$$

where;

DV = change in velocity of the rocket

U = velocity of exhaust gases relative to the rocket

M_i = initial mass of the rocket and fuel

M_f = final mass of the rocket

For a satellite in LEO, DV = 7 km/s while U » 2.4 km/s, typically

DM = 0.95 M_i or the fuel should be 95% of the initial mass

Taking gravity into account, this increases to 97%, so only 3% of the initial mass is available for the rocket and payload!

Launching into GEO (Geostationary Equatorial Orbit) requires quite a bit more energy than LEO, but most of the energy is consumed during the initial part of the launch.

~35 MJ/kg are needed to reach 850 km

1 joule per second = 1 watt

So, to put 2.2 lbs (1 kg) into an 850 km orbit would require 35 million watts

746 joules/sec = 1 hp, thus 2.2 lbs would require 46,917 hp to reach this orbit

Each pound needs 21,325 hp or 15,909,090 watts to reach an 850 km orbit

Each ounce needs 1,332 hp or 994,318 watts

Nearly a million watts of power are needed to orbit just 1 oz. at 850 km.

~23 MJ/kg more are needed to reach GEO (42 times further from the surface), so;

58 MJ/kg are needed for GEO (58 million Joules for each kg of satellite mass)

So, it is very obvious why fuel efficiency and weight is so important in launching satellites. As I have said, it is most fuel efficient to launch directly into the desired inclination. Changes in the orbit plane are

very expensive in terms of fuel. So the launch site plays a big part in determining the amount of fuel needed to lift a certain mass. The closer the launch site is to the intended inclination, the more fuel efficient the launch can be and thus the more mass can be lifted for the same amount of fuel compared to a different latitude.

There has been a good deal of talk lately about privately built launch vehicles since SpaceShipOne captured the X Prize with its flights up to 100km (62 miles). Now this may seem high, but it is only about 1/3 of the way to the ISS orbit and 1/8 of the way to most LEO orbits. You will see later how the payload weight drops off quickly with altitude. Dan Schultz wrote an informative and understandable paper for the 2004 AMSAT Symposium on "Why is Space Flight So Difficult? A Look at Kinetic Energy Requirements for Orbital Flight". This is available in the 2004 AMSAT Symposium Proceedings, along with twenty-nine other papers that should appeal to all amateur satellite operators. Get your copy today online or call Martha at AMSAT headquarters.

Launch Vehicles

One of the best resources I have found that describes the launch vehicles in extraordinary detail including the lift capacity, launch history and launch cost is the book *International Reference Guide to Space Launch Systems* (Figure 1). You can get this at many university libraries or order

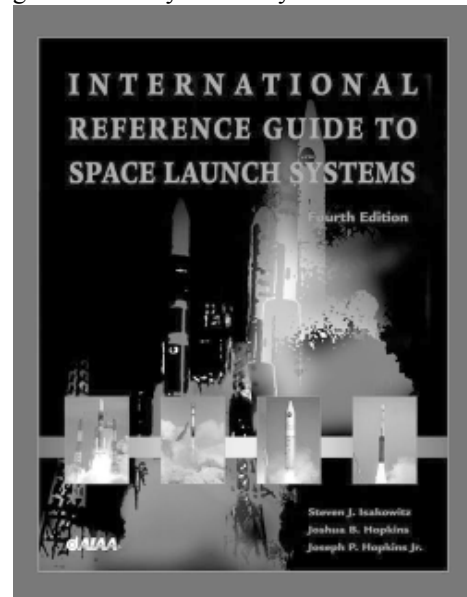


Figure 1: Launch vehicle reference book.



it for about \$75. I highly recommend this for very interesting reading and a great introduction to a field many of us have little to no knowledge. I just found out that there is an updated version of the Reference Guide that came out in October 2004, so the information will be more up to date.

Just as there are many satellites with many functions, there are many launch vehicles with many capacities. It requires a great deal of research to find the correct launch vehicle that can lift the necessary mass to the orbit you need at the cost you can afford. In fact, it may be the case for many non-profit and academic groups seeking launches that the payload is dictated by the launch opportunity.

As already discussed, spacecraft mass is at a premium. Looking at Figures 2 through 7 you can see the diversity of launch vehicle lift capabilities to different altitudes and inclinations. These range from the small Start and Taurus launch vehicles that can only lift 100-200 kg into an 800 km orbit to the

Launcher Height (km)	Start1 Payload (kg)	Start Payload (kg)	Taurus Payload (kg)
400	232.55	306.93	562.63
500	190.68	289.59	463.14
600	160.10	267.61	369.59
700	125.99	232.54	297.23
800	111.00	201.99	232.11

Figure 2: San Marco launch site.

powerful Ariane rocket that can lift 7500 kg into the same orbit – 50 times the mass. The reason that there are so many different types of launch vehicles is that the cost to put a satellite into orbit differs greatly. Those wishing to launch a satellite find it is well worth the effort to comparison shop. The launch cost varies from \$9 million for the Start launch vehicle to \$85 million for the Ariane rocket.

Keep in mind that the old adage “You get what you pay for” is still appropriate in selecting launch vehicles. Often the inexpensive launches may be for new, untested vehicles or rockets that haven’t proven their reliability or they may just be smaller rockets with fewer stages. Lately a number of former military missiles have been converted to launch vehicles for satellites, rather than their previous payload of nuclear weapons. Instead of destroying the LV, they are re-purposed and provide a cost effective service for many universities,

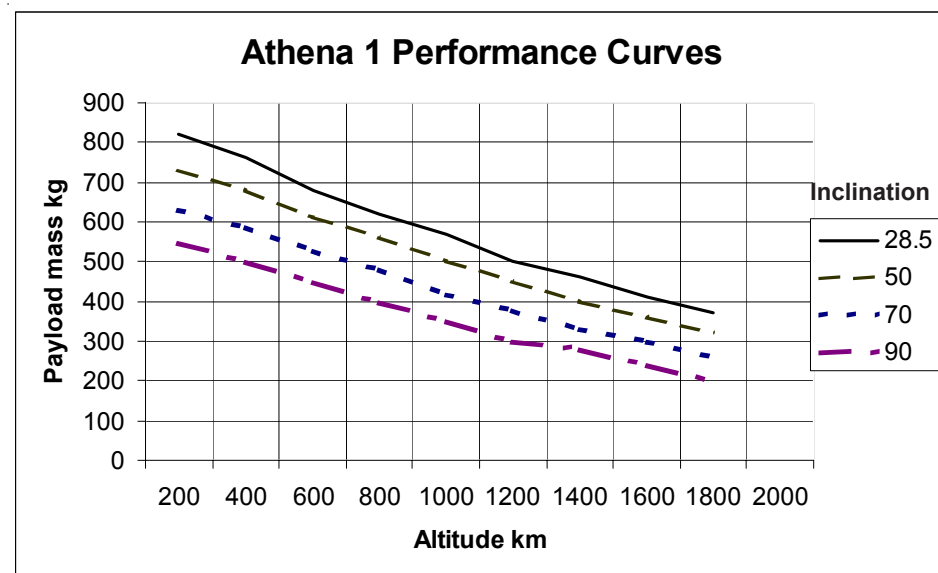


Figure 3: Athena 1 launch vehicle curves from Kodiak launch site.

small companies, countries and commercial organizations. [That is exactly how AO-51 was launched. - Ed.]

Launch Vehicle Performance Curves

I mentioned earlier about the tradeoffs between altitude, payload mass and inclination. The following performance curves graphically show this tradeoff for a number of LV’s. The maximum payloads for these rockets range from the Start1 LV that can only take 232 kg up to 400 km, and be sure and notice how quickly this drops off. To go to 800 km or twice the altitude, it can only carry half the 400 km payload. The Athena LV in Figure 3 was used to put PCSAT into orbit.

Its maximum payload is 800 kg launched to only 300 km and at a 28.5° inclination. To get a satellite to an altitude of 800 km the maximum payload drops to 650 kg. PCSAT was aboard the first flight of the Athena rocket from Kodiak.

Figure 4 shows the curves for the Kosmos-3 LV. Notice that it can take a 1400 kg payload, but only to 400 km and 28.5° inclination. If you want to use the Kosmos-3 to put a satellite into a Sun Synchronous orbit at 800 km (like AO-51) it can only carry about an 800 kg payload.

The Dnepr-1 LV curves shown in Figure 5 show that this LV can lift 3600 kg up to 300 km (ISS altitude). This does make it a good backup vehicle to support the ISS. Notice

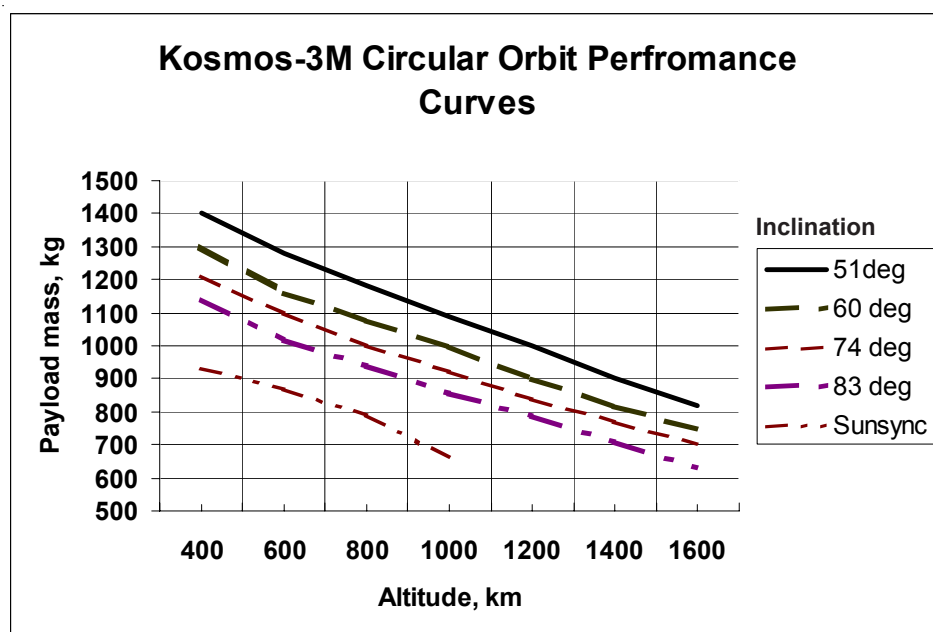


Figure 4: Kosmos-3M performance curves.



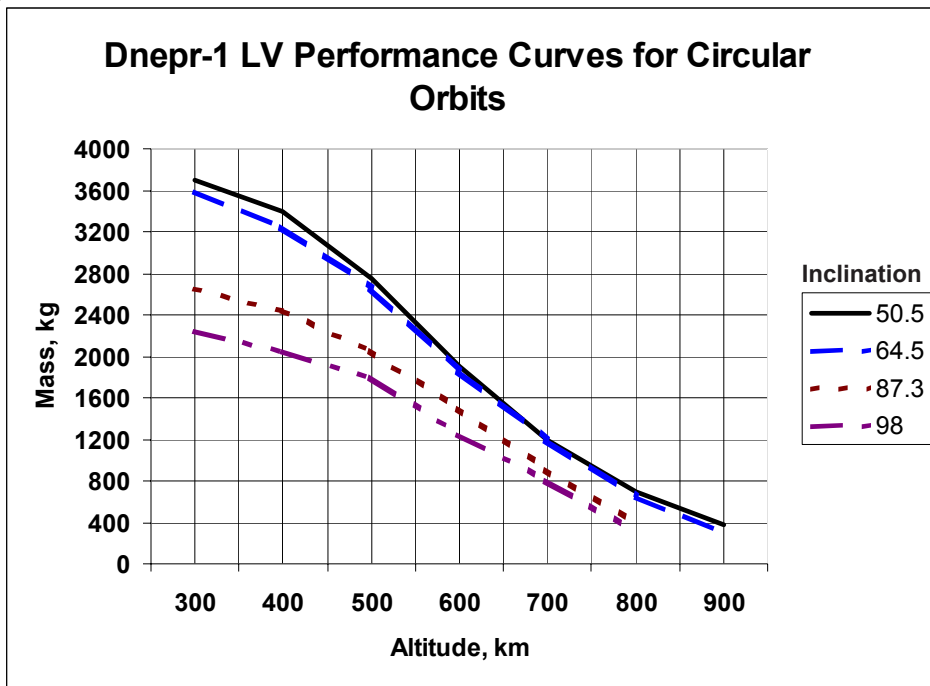


Figure 5: Dnepr-1 performance curves for circular orbits – Echo launch vehicle.

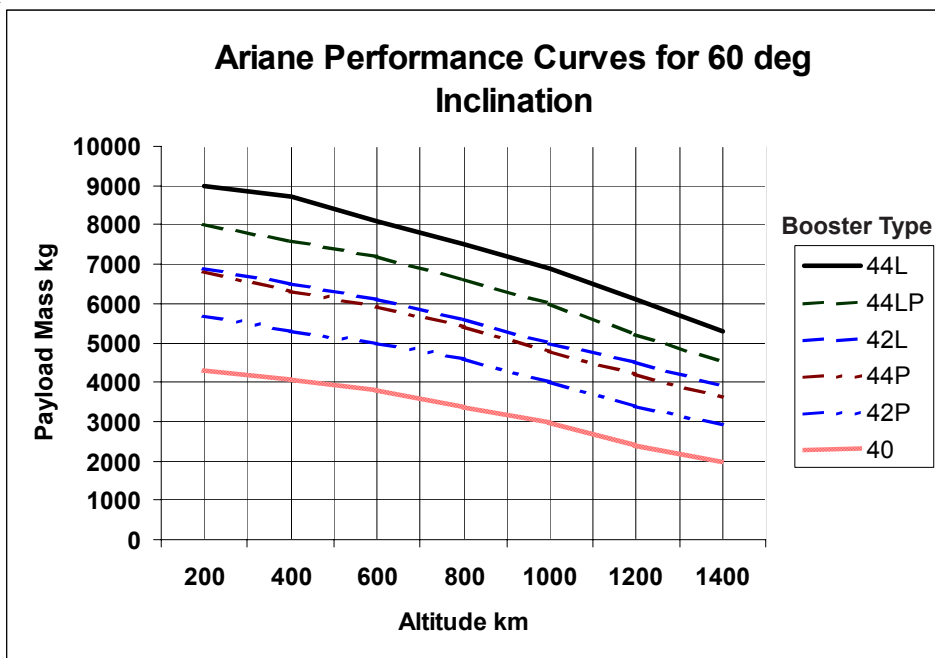


Figure 6: Ariane 4x performance curves.

that an 800 km SSO orbit is right at the maximum ability of this LV. In fact, the AO-51 launch on this vehicle was the first time this rocket put a satellite into SSO. For the Dnepr LV to get a payload into SSO the maximum weight can only be 400 kg. The total launch payload for the 8 satellites on the AO-51 flight was about 270 kg.

Now we move into the heavy lifters – the Ariane 4 series LV (Figure 6). The different configurations listed for the 40, 42, 44 describe the number of external strap on

booster rockets. The LP suffix defines whether these boosters are liquid or solid fuel. The curves in Figure 6 show that these big boys can lift 7500 kg into an 800 km orbit with a 60° inclination. Even the plain 40 version Ariane LV can lift a 2000 kg package all the way up to a 1400 km altitude. But at what cost? Check out the table in Figure 8.

What Does it Cost to Launch a Satellite?

This is a very difficult question to answer.

There is little public data available and much of that is given over a wide range of millions of dollars. The launch fee is a very negotiable item. As such, the actual fees are not often published. This leaves the field wide open for the next opportunity and negotiation. Below are tables of most of the current launch vehicles by country. Look at the rapid decrease in mass that the LV can carry in going from LEO to Sun Synchronous Orbit (SSO) to GTO (Geostationary Transfer Orbit). In Figure 9, the Dnepr-1 LV can lift 4500 kg into LEO, but only 140 kg into SSO. Then move over to the launch cost [in millions of dollars] column and do a little quick math to figure out the cost per kilogram (2.2 lbs). It is quite a staggering figure. Take the Delta IV Medium in Figure 8, 8,600 kg payload into LEO for about \$82,000,000 USD. That works out to \$9,534 per kg. If you use the same LV and maximum payload of 6300 kg into SSO it jumps to \$13,015 per kg. The launch cost numbers are a little dated. The exchange rates and inflation have changed a great deal over the last 8-10 years.

Who has Gone into Space?

Figure 10 lists the first ten countries that launched vehicles into space. This doesn't have a great deal to do what we have been talking about, except they used launch vehicles. But I found it quite interesting and think you might. Who knows, you might get that question on Jeopardy one day. Note that there wasn't even a 10th country until 1989.

Summary

1. All 72 amateur satellites have been launched from only eight sites.
2. There are less than two dozen active satellite launch sites in the world.
3. A number of countries have combined resources to build and launch rockets.
4. A satellite launched due east will have an inclination equal to its latitude.
5. It takes a great deal of energy to launch a satellite.
6. Most launch sites are restricted in their launch direction by where the rocket stages can safely fall.
7. Satellites travel slower the further they are from the earth.
8. Orbit plane changes require a great deal of energy.
9. 97% of a launch vehicle's mass is fuel.
10. There is a very wide range of fees charged to launch rockets.

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<http://www.russianspaceweb.com> **excellent site 🌐

Figure 7: United States launch vehicles, capacity and costs.

Country	Vehicle	LEO Max. (kg)	SSO (kg)	GTO (kg)	Launch Cost (\$M)	First Flight	Launch Site
United States	Athena I	820	360	n/a	16-17	1995	Vandenberg, Cape Canaveral
United States	Athena II	2,065	1,165	590	22-26	1998	Vandenberg, Cape Canaveral
United States	Atlas IIA	7,316	?	3,066	75-85	1992	Cape Canaveral, Vandenberg
United States	Atlas IIA S	8,618	?	3,719	90-105	1993	Cape Canaveral, Vandenberg
United States	Atlas IIIA	8,640	5,671	4,037	90-105	1999	Cape Canaveral
United States	Atlas IIIB	10,718	5,885	4,477	90-105	2000	Cape Canaveral
United States	Atlas V 400	12,500	?	5,000	75-90	2001	Cape Canaveral, Vandenberg
United States	Atlas V 500	20,050	?	8,200	85-110	2001	Cape Canaveral, Vandenberg
United States	BA-2	17,000	11,500	5,800	?	2000	Sombrero Island
United States	Delta II	5,140	3,220	1,870	45-60	1990	Cape Canaveral, Vandenberg
United States	Delta III	8,290	6,100	3,810	85	1998	Cape Canaveral,
United States	Delta IV Medium	8,600	6,300	3,900	75-90	2001	Cape Canaveral, Vandenberg
United States	Delta IV Medium Plus	13,600	9,600	6,120	85-110	2001	Cape Canaveral, Vandenberg
United States	Delta IV Heavy	25,800	19,200	12,400	140-170	2003	Cape Canaveral, Vandenberg
United States	K-1	4,600	1,250	n/a	17	2000	Woomera, Nevada
United States	Minotaur	639	336	n/a	12.5	1999	Vandenberg, Others
United States	Pegasus XL	443	190	n/a	12-15	1994	Vandenberg, Cape Canaveral
United States	SSLV Taurus	1,320	660	400	18-20	1994	Vandenberg, Others
United States	Comm Taurus	1,380	720	448	18-20	1998	Vandenberg, Others
United States	Titan II	1,900	?	?	30-40	1986	Vandenberg
United States	Titan I/B	21,680	?	?	350-450	1997	Cape Canaveral, Vandenberg
United States	Space Shuttle	24,400	n/a	n/a	300	1981	Kennedy Space Center

Country	Vehicle	LEO Max. (kg)	SSO (kg)	GTO (kg)	Launch Cost (\$M)	First Flight	Launch Site(s)
Europe	Ariane 40	5000	2,845	2,175	65-85	1990	Kourou
Europe	Ariane 42P	6600	3,845	2,890	70-90	1990	Kourou
Europe	Ariane 44LP	9100	5,660	4,290	90-100	1988	Kourou
Europe	Ariane 44L	10,200	6,485	4,790	100-125	1989	Kourou
Europe	Ariane 5	18,000	12,000	6,800	150-180	1996	Kourou
Russia	Angara 1.1	1,600	?	n/a	?	2001	Plesetsk
Russia	Angara 1.2	3,500	?	1,800	?	2002	Plesetsk
Russia	Angara 5L	24,500	?	6,800	?	2003	Plesetsk
Russia	Kosmos 3M	1,500	775	n/a	12	1967	Plesetsk
Russia	Proton K	19,760	3,620	4,910	90-98	1967	Baikonur
Russia	Proton M	21,000	?	5,500	100-112	2000	Baikonour
Russia	Rockot	1,800	1,000	n/a	13-15	1994	Plesetsk, Baikonour
Russia	Shtil-1	430	?	n/a	0.1-0.3	1998	Delta IV Submarine
Russia	Shtil-2	350	?	n/a	?	?	Delta IV Submarine
Russia	Start-1	632	167	n/a	9	1993	Svobodny, Plesetsk
Russia	Start	?	?	n/a	10.5	1995	Svobodny, Plesetsk
Russia	Strela	1,700	?	n/a	10.5	2000	Svobodny
Russia	Soyuz U	7,000	2,750	1,350	30-50	1963	Baikonour, Plesetsk
Russia	Soyuz ST	7,800	4,500	1,450	30-50	2001	Baikonour, Plesetsk
Russia	Molniya	n/a	1,500	n/a	30-40	1960	Baikonour, Plesetsk
Ukraine	Dnepr-1	4,500	140	n/a	10-20	1999	Baikonour
Ukraine	Dnepr-M	4,140	1,600	n/a	10-20	2001	Baikonour
Ukraine	Tsiklon 2	3,350	2,100	n/a	20-25	1967	Baikonour
Ukraine	Tsiklon 3	4,100	n/a	n/a	20-25	1977	Plesetsk
Ukraine	Zenit 2	13,500	5,000	n/a	35-50	1985	Baikonour
Ukraine	Zenit 3SL	?	?	5,000	75-95	1999	Sea Launch

Figure 8: ESA and CIS launch vehicles, capacity and costs.



Figure 9: Launch vehicles, capacity and cost from other countries.

Country	Vehicle	LEO Max. (kg)	SSO (kg)	GTO (kg)	Launch Cost (\$M)	First Flight	Launch Site(s)
Brazil	VLS	380	80	n	8	1997	Alcantara
Brazil	VLM	100	18	n	4	2002	Alcantara
China	LM-2C	3,900	?	1,400	20-25	1975	Taijun, Jiuquan
China	LM-2D	3,500	?	n	?	1992	Taijun
China	LM-2E	9,500	?	3,500	45-55	1990	Xichang
China	LM-2E(A)	15,300	?	n	?	2000	Xichang, Jiuquan
China	LM-2F	?	?	?	?	2000	Jiuquan
China	LM-3	?	?	1,500	35-40	1984	Xichang
China	LM-3A	?	?	2,600	45-55	1994	Xichang
China	LM-3B	11,200	6,000	5,100	50-70	1996	Xichang
China	LM-3B(A)	?	?	7,000	?	2002	Xichang
China	LM-3C	?	?	3,800	55-75	?	Xichang
China	LM-4	?	1,650	n	20-30	1988	Taiyuan
China	LM-4B	?	2,800	n	25-35	1999	Taiyun
Japan	H-II	10,060	4,220	3,930	165-170	1994	Tanegashima
Japan	H-IIA 202	9,940	4,350	4,100	75	2000	Tanegashima
Japan	H-IIA 212	17,280	?	7,500	?	2001	Tanegashima
Japan	J-1	850	n	n	30-45	1996	Tanegashima
Japan	M-V	1,800	?	1,250	55-60	1997	Kagoshima
India	PSLV	3,700	1,200	800	15-25	1993	Sriharikota
India	GSLV	5,000	2,200	2,500	35-45	2000	Sriharikota
India	Shavit 1	225	n	n	10-15	1995	Palmachim
India	LeoLink 1	550	?	n	10-15	2000	Various
India	LeoLink 2	1,550	?	n	18-20	2001	Various

Country	Launch Complex	Launch Order	First Launch	Comments
Russia	Baikonur Cosmodrome - Tyuratam	1st	4-Oct-57	Sputnik I & Yuri Gagarin
United States	Cape Canaveral Air Station	2nd	31-Jan-58	Titan, Atlas, Delta
France	Hamaguir, Algeria & Kourou	3rd	26-Nov-65	
Japan	Kagoshima on Kyushu Island	4th	11-Feb-70	Sounding & 24orbital
China	Jiuquan Space Launch Center - Shuang Cheng Tzu	5th	24-Apr-70	
Australia	Woomera	6th	28-Oct-71	Launched together
Great Britain	Woomera	6th	28-Oct-71	
Europe	Kourou, French Guiana	7th	24-Dec-79	Equatorial & polar
India	Sriharikota Island	8th	18-Jul-80	Polar & GEO
Israel	Palmachim Air Base	9th	19-Sep-88	
Iraq	Al-Anbar	10th	5-Dec-89	

Figure 10: First countries to launch vehicles into space.

HT and AL800 Antenna – An Excellent Portable Satellite Station

Allen F. Mattis, N5AFV, n5afv@amsat.org

Abstract

Satellite demonstrations at hamfests and other similar events almost always draw a group of interested onlookers who are quite often surprised to learn that it doesn't take expensive or elaborate equipment to make satellite contacts. My preferred personal choice for portable FM LEO satellite operation is an HT with a Premier (Pryme) AL800 antenna. The FM LEO satellites are well suited for operators with small portable satellite stations, and as a result, these popular satellites allow the activation of many rare maidenhead grid squares. With today's FM satellites it is possible to work a satellite pass from almost any location that provides the operator with a clear line-of-sight window to the bird.

Use of HT's to Work the FM Satellites

The Amateur Radio satellite literature contains a number of articles describing portable operation by various operators on the FM LEO satellites. While a few operators like Glasbrenner (2005) describe operating with larger radios, most of portable FM LEO satellite operation has been done with dual-band HT's. MacAllister (1997 and 2000), Devlin (Anonymous, 2000) and Mattis (2003) have described their operations using HT's on cruise ships. Soifer (1999) operated in the United Kingdom and Sheets (1999) operated in the US Virgin Islands, both using HT's. The antennas used by these operators ranged from rubber ducks to the Arrow beam.

Equipment Options

The kind of portable operation on the FM satellites that I enjoy is being able to operate wherever I travel. That kind of operation requires small lightweight equipment. A dual-band HT that has dual reception (both bands at the same time) is ideal because it allows the operator to hear himself in the downlink. Most of these units have a high-power capability of five watts. I use an Icom W32A HT; however, any other dual-band dual reception HT that covers the satellite bands may also be used.

The antenna is very important because, as we all know, if you can't hear them, you can't work them. The small rubber duck antennas that come with an HT do not usually have enough gain to hear the bird very well. The Arrow beam and similar antennas have

excellent gain however, they are a little large to carry around, take time to assemble and draw attention to the operator. A middle group of antennas, consisting of long or extended rubber ducks and telescoping antennas, provide more gain on receive than standard rubber ducks, are very compact, and require no time to assemble. It is this middle group of antennas that suit my operating needs.

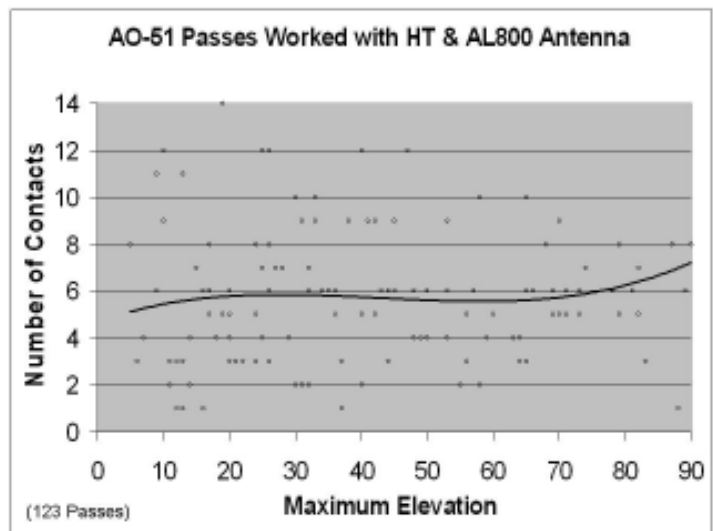
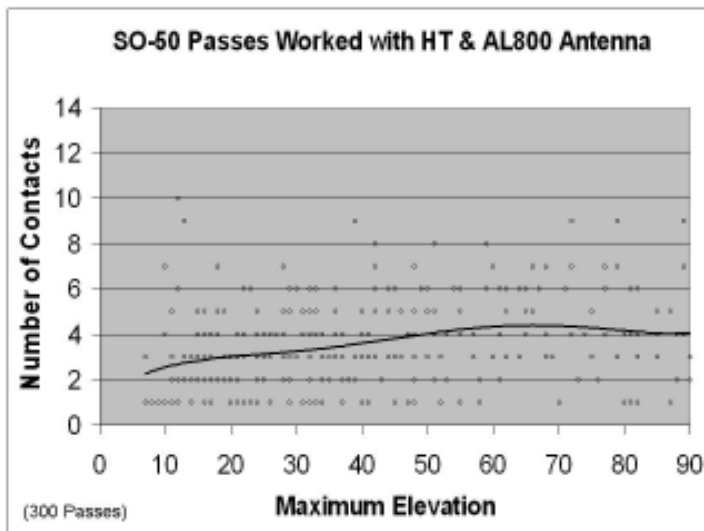
The extended rubber ducks and telescoping antennas have enough gain on the downlink to allow the operator to hear most of the satellite pass, and the gain on the uplink signal is strong enough to get into the bird if the operator does not double with a stronger station. One advantage of these antennas has been described by Soifer (1999) as "Armstrong X, Y and Z axis rotation". The user has the ability to orient the antenna in any position to match any possible polarity shifts of the satellite's signal. The MFJ-1717 16-inch rubber-coated dual-band antenna, which was used by Soifer when he operated in the United Kingdom, is probably the most popular extended rubber duck antenna used by satellite operators. MacAllister (1997)

used a similar antenna, the Diamond RH77 15-inch rubber-coated dual band antenna, on his cruise. Another very popular HT antenna used by satellite operators is the Premier (Pryme) AL800 34-inch telescoping dual-band antenna. The AL800 and other similar telescoping antennas are heavier in weight and size than the extended rubber duck antennas. Some operators feel that they are perhaps a little too heavy to use with newer group of mini-HT's with SMA connectors. I have had the opportunity to switch back and forth between the Premier (Pryme) AL800 and MFJ-1717 antennas while making contacts on SO-50 and AO-27. It was my observation that both antennas performed acceptably; however, the Premier (Pryme) AL800 appeared to provide better reception than the MFJ-1717. The bottom line is that each operator needs to decide which of these antennas best meets their needs and works well with their other equipment.

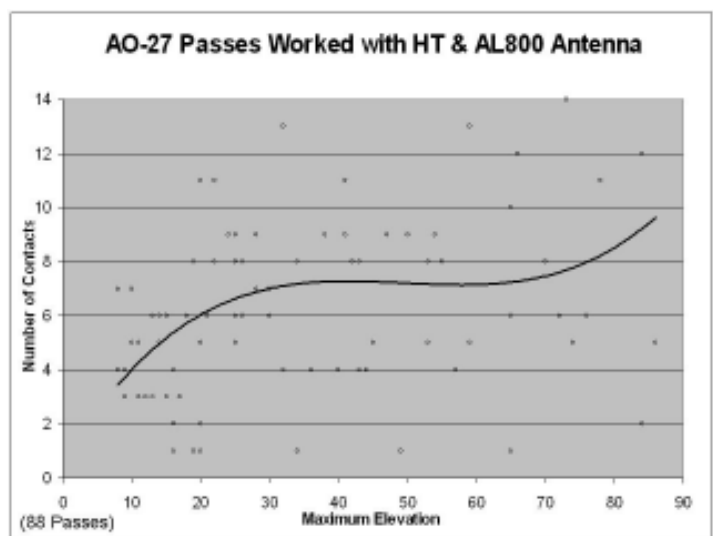
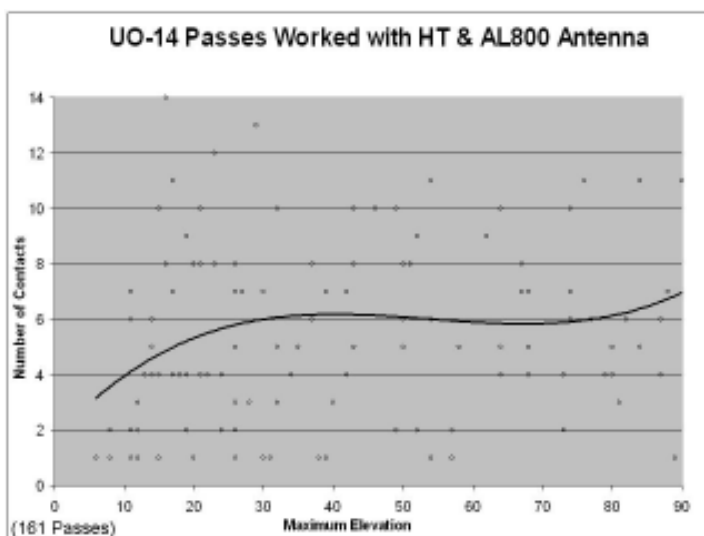
I like to wear a headset with a boom microphone when I operate with my HT and AL800 antenna because it allows me to hear myself in the downlink. My usual choice of



At the Alamo in San Antonio, Texas (EL09sk) I was able to work satellite passes with my HT & AL800. Note DPS officer present in lower left.



Results of working 300 SO-50 passes and 123 AO-51 passes with an Icom W32A HT and AL800 antenna (arithmetic means).



Results of working 161 UO-14 passes and 88 AO-27 passes with an Icom W32A HT and AL800 antenna (arithmetic means).

headset is an MFJ-288I. The headset puts the sound directly into my ear, which makes it easier to hear the satellite if it is windy. Also, no matter what position the HT is in, I am able to hear the satellite and speak into the microphone. If, however, I were doing a satellite demonstration at a hamfest or similar event, I would want to use equipment where the observers could hear the satellite.

There are times when you may not want to call attention to yourself, and the headset is ideal for those situations. My occasional trips to San Antonio provide an example. On a number of occasions, I have enjoyed operating satellites passes while standing less than fifty feet from the front door of the Alamo. I am certain that the Texas Department of Public Safety officers who guard the Alamo twenty-four hours a day would never let me operate at that location

if they heard my radio or if I used an Arrow antenna. My HT, AL800 antenna, and MFJ headset have allowed me to operate an impromptu special event station from the Alamo, and I plan to do so again the next time I have the opportunity when I am in San Antonio.

Operating Hints from the Literature

The most difficult aspect of working the FM satellites with an HT and extended rubber duck or telescoping antenna is being able to hear the satellite. Bob Bruninga devised a homebrew reflector built from wire mesh that focuses the satellite's signal on an HT and greatly improves the ability to copy the downlink, even with a standard rubber duck antenna (Duey, 2001).

Duey (2001) developed what he has termed the "rental car" technique, which improves the performance of an HT with an extended

rubber duck or telescoping antenna for passes of thirty degree elevation or higher. In this technique, a car is parked in a north-south direction with the hood facing the horizon where the satellite will first appear. As the satellite comes up over the horizon, the HT is held about four inches in front of the hood. Reflections off the hood improve performance of the HT until the satellite reaches an elevation of about fifteen degrees. The HT is then moved to between the hood and windshield. As the satellite reaches even higher elevation, the HT is held vertical with the antenna connector at about roof level. Toward the end of the pass the HT is moved to the trunk area. Duey reported that this technique worked well with UO-14, but showed only marginal signal improvement with AO-27.

Most operation on the FM satellites with an

HT and extended rubber duck or telescoping antenna is done in the open without the benefit of a manmade reflector to focus the satellite's signal on the HT's antenna. Duey (2001) observed that on passes of ten to thirty degrees in elevation local objects and terrain could be used to boost signals if the HT was inverted or held upside down with the antenna pointing toward the ground. Clarke (2004) recommended tilting the HT about the same amount from vertical as the satellite's elevation to improve reception. If you are facing the satellite you tilt the antenna downward, and if your back is toward the satellite you tilt the antenna upward.

Operating Hints from Experience

The technique I developed by making over three thousand satellite contacts with my HT and AL800 antenna agrees for the most part with the observations of Duey (2001) and Clarke (2004). When the satellite is low to the horizon, the downlink signals often reflect off the ground. Holding the HT upside down with the antenna pointing toward the ground greatly improves the reception of the satellite when it is at low elevations. The lower the satellite is, the closer to vertically

upside down I hold the HT. As the satellite climbs higher, above about 20 degrees elevation, I begin to hold the HT as described by Clarke, at angle of about the same number of degrees from vertical as the satellite's elevation. It is necessary to move the antenna around (Soifer's Armstrong X, Y and Z axis rotation) as the polarity of the downlink signal shifts to maximize the signal strength, and it is sometimes necessary to go back to holding the HT with the antenna pointing toward the ground for brief periods. If the satellite is at an extremely high elevation angle of 75 degrees or greater, holding the HT horizontal may provide maximum signal strength. As the satellite begins to drop toward the horizon, the sequence is repeated in reverse order, ending with the HT being held vertically upside down as the satellite drops below the horizon.

The lowest elevation pass on which I have made contacts with my HT and AL800 antenna was a five degree elevation pass of AO-51. For other FM satellites the lowest elevations with contacts were six degrees on UO-14, seven degrees on SO-50 and eight degrees on AO-27. In general, it is usually difficult to make contacts with an HT and AL800 antenna on satellite passes with elevations less than about ten or twelve degrees.

The effectiveness of an HT and AL800 antenna varies somewhat from satellite to satellite, probably due to differences in the antennas on the satellites, and due to the individual characteristics of each bird. It is very seldom that I do not make at least one contact on a satellite pass when I use my HT and AL800. I have found that AO-27 is the easiest of the current FM satellites to work with this equipment, and SO-50 is the most difficult.

Conclusion

An HT with a Premier (Pryme) AL800 telescoping antenna makes an excellent portable station to work the

FM LEO satellites. The addition of a headset with a boom microphone allows full duplex operation and gives the operator the ability hold the HT and antenna in almost any position and still be able to hear the bird and speak into the microphone. This equipment makes it possible to work today's FM LEO satellites from almost any location.

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Scott Medbury, KD5FBA, dressed in Scottish attire for his friend's wedding, took a break to work a satellite pass with his Icom W32A HT and AL800 Antenna.



Field Ops Update

G. Gould Smith, WA4SXM, wa4sxm@amsat.org

The cherry trees are blooming in Washington, the Florida beaches are recuperating from another spring break and the internal sleep/wake clock for most people has adjusted to the annual time change. This means that the great ham migration to central Ohio is just around the corner.

AMSAT at Dayton

Barry, WD4ASW, has assembled a great lineup of speakers for the AMSAT Forum on Saturday morning.

Moderator: Barry Baines, WD4ASW, VP-Marketing & User Services, AMSAT-NA

- Rick Hambly, W2GPS, "AMSAT's Mission and Vision"
- Jim Sanford, WB4GCS, "Eagle Project Update"
- Sam Jewell, G4DDK, "An Update on SSETI Express Student/AMSAT-UK Satellite"
- Frank Bauer, KA3HDO, "Human Spaceflight Update (ARISS & Future Exploration Initiatives)"

There will be a number of new/updated publications and trinkets available at the AMSAT booth at the Dayton Hamvention. The booth and the hamfest are located in the same place. The *Getting Started in Amateur Satellite* book has been updated with AO-51 information, as well as additional information on things to know in getting started. There is a new color publication about AO-51, which came out in January 2005. Included are numerous photographs, screen shots and a much improved section on operating AO-51. There are more than 25 new pages from the original ECHO book. Be sure and stop by and meet your AMSAT officers and volunteers. If you can volunteer a couple of hours to help in the booth, this would certainly be appreciated. There is a new publication available – *Digital Satellite and Telemetry Guide*. This is a major overhaul of the 2002 Digital Satellite Guide. There are 20+ pages about using WiSP as well as telemetry information and examples for all the amateur satellites downlinking telemetry.

Other events include the Fourth Annual Thursday night AMSAT "Pizza n' Suds" party and the Friday night AMSAT Banquet,

with astronaut Tony White speaking. There will also be the usual great camaraderie at the AMSAT booth all during Hamvention.

Hamfests

I have a goal this year to have more AMSAT representation at hamfests. It is invaluable to have a presence at as many hamfests as possible. I bet that 80% of the people that sheepishly come up to the booth say "I have been interested, but don't know anything about it." People are asking for information – what better audience could you have? You can enthusiastically talk about something you enjoy so much, and spread some knowledge. I generally have no problem getting them to leave with a *Getting Started* guide. This way they can review what we talked about and have a reference when they are ready to try satellite operation. If you are not leading the booth, please volunteer to help in the booth. Booth volunteers do not have to be Area Coordinators (AC). If you want to help, get in touch with one of the AC's near by and let them know. There are 50 or so hamfests each month. I feel that every Area Coordinator should either represent AMSAT at a hamfest or volunteer during the hamfest. Often the hamfest committee will donate a table, especially if you give a forum. The Field Ops's Support Site (FOSS) has many tools and presentations available for you. If you are an AMSAT member that would like to have an Area Coordinator do a presentation for your club or group, look up an Area Coordinator in the Area Coordinator list or check the AMSAT Web site for a list by state of current AC's. We are constantly adding Area Coordinators, so check the Web site for the up to date list. I think the most difficult part of representing AMSAT at a hamfest is for people just to decide that they are going to do it. Make that decision; have a table at a local hamfest be it large or small. It is quite rewarding to talk with a number of interested people and see them leave with a new outlook on satellite operation. Knowing that they can do it and it can be done without a major investment. Satellite operation is not difficult, just new things to learn and put into practice.

AC Spotlight

This month we will begin a new section on spotlighting an AMSAT Area Coordinator.

Most of the coordinators volunteer many hours showing the flag for AMSAT at hamfests, doing club and group presentations and demonstrating satellite operation. If you are willing give a little back to AMSAT, please send your request to Gould Smith, wa4sxm@amsat.org. This month we spotlight one of our most active volunteers. Let me introduce **Dee Interdonato, NB2F**, in his own words:

"A member since 1983, I believe I started as an AMSAT volunteer to fill a void here in the North Jersey area. I had been to our local hamfest, Bergen Amateur Radio Club - B.A.R.A., and was part of the club's hierarchy (VP at the time) and involved with setting up the combined efforts to host an ARRL Division Convention. There was a representative for AMSAT at one of our indoor locations and he had a few trinkets and a small table and being a member already I was very interested to see AMSAT there to disseminate information. I became involved at that point with making a "BETTER" effort to go to the local hamfests to become an "ambassador of AMSAT" of sorts. Starting out at B.A.R.A., I was asked to attend other hamfests and my efforts snowballed. One of my early careers included shipboard and earth station satellite navigation and satellite communications – a perfect avenue to combine hobby and career at the same time."

"Since I was active on most of the satellites that were operational, I could give tips for station setup and operational suggestions for newcomers. Of course, I became the satellite guru of my club and was called upon to assist at "Elmering" others. I realized that our organization needs a grassroots level of people so I started to attend many hamfests in the area with packages from Martha. Face to face questions and answers give those that come by to chat a feeling of actually being heard by AMSAT. All the books (keep them coming Gould) we have to offer back up my suggestions and hints and I never go to any hamfest without an operating demo of one of our satellite tracking programs to show others what they need. A printout of the latest ANS and Operational Satellite info helps with facts."

"The Cherryville, NJ hamfest (March 12th.) even has a reserved spot for me so everyone knows where my table will be every year. I



have given operational demonstrations at some hamfests (Sussex, NJ & Dunellen, NJ as examples) that have drawn some attention and hopefully interested someone watching. I have taken a table in several Pennsylvania area hamfests. Not to outdo any area co-coordinator out there but because there was a need for AMSAT's presence. Through these hamfests I have been asked to provide a talk-presentation at several clubs in NJ. Demonstrations at a club meeting are not always practical as the satellites up presently do not present themselves when you want them to. Also, the local physical criteria are not known. Many similar questions are heard during these talks but answering one of them usually satisfies the other 10 that wanted to ask the same one! I find hams to be a varied lot as some are at the engineering level and the majority are appliance operators. If I cannot answer a particular question, I tell them *where* to find answers. One of the reasons I set up a table at a Hamfest or do a presentation is because of the fun watching those light bulbs going on as the puzzles disappear. Presentations must be tailored to the caliber of the group I am advised will be present. (Technical? Satellites? Tracking? Station setups? etc.) Since I have many Power Point presentations on tap that I have designed, there is always a way to modify one to the needs of those present. I have a stack of overhead projections too. My motto on presentations is "I work for donations" and my efforts come with that stipulation so I walk away with something for the AMSAT coffers."

"I have fun too operating on the satellites. However, my "off from work time" is usually not when the satellites are in view. There is a 10' dish in my backyard I used for AO-40 & weather sats. The normal KLM beams and 1.2 GHz and 2.4 GHz antennas are on the roof. My home satellite station is simple and easy to operate with an ICOM 820H at its heart. I try to practice what I preach to counter the opinions of those that feel you need to spend thousands on a system (another myth busted!). Some items I suggest to spend money on are the coax and antennas w/ preamps and tracking programs."

"I also volunteer as an editor for the ANS you see delivered to the BB through the mentoring of Lee McLamb, KU4OS. Lee insists we try to bring a timely report with some upbeat news to the satellite community. Every year that I can make Dayton I assist

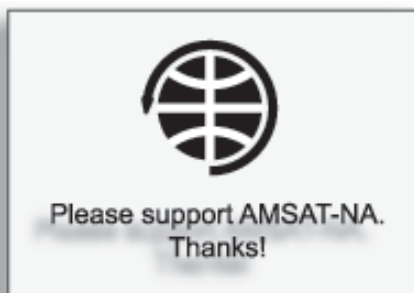
at the AMSAT booth there. This gives the presenters time to see that the talks are jam-packed and they sure are."

"Attending many Symposiums, (I have presented a paper at one) allowed me to meet many of the active people involved with AMSAT. I try to ask the more important questions to keep up with all the happenings in AMSAT so questions can be answered at hamfests and presentations. Some of this information you will not find in any publication. I even had a reunion of sorts with a past AMSAT VP, John Champa, K8OCL. He was in the Army with me in 1970 and I re-discovered his whereabouts after seeing his picture in an issue of *Orbit* magazine, a predecessor to the *Journal*.

"There are many volunteer opportunities within AMSAT. I do this as "payback" for the enjoyment of this end of the Hobby. Find your niche and fill it."



Dee Interdonato, NB2F.



Field Day ... continued from page 14

Bruce Paige, KK5DO
Director of Awards and Contests
PO Box 310
Alief, TX 77411-0310.

The first-place emergency power/portable station will receive a plaque at the AMSAT General Meeting and Space Symposium in Lafayette, Louisiana, October 7-8, 2005. Certificates will be awarded for second and third place portable/emergency operation in addition to a certificate for the first-place home station running on emergency power. Stations submitting high, award-winning scores will be requested to send in dupe sheets for analog contacts and message listings for digital downloads.

You may have multiple rig difficulties, antenna failures, computer glitches, generator disasters, tropical storms and there may even be satellite problems, but the goal is to test your ability to operate in an emergency situation. Try different gear. Demonstrate satellite operations to hams that don't even know that the HamSats exist. Test your equipment. Avoid making more than ONE contact via the FM-only voice HAMSATS or the ISS, and enjoy the event!

This form is designed to allow for easy editing in a Word Processor.

AMSAT Satellite Summary Sheet - 2005

Satellite and number of Voice QSO's
AO-27 1 (example)

(...additional space as required)

Satellite and number of CW/RTTY/PSK31 etc. QSO's

FO-29 5 (example)

(...additional space as required)

Satellite and Up/Downloads

UO11 3 (example)

(...additional space as required)

Score Calculation

Total Voice QSO's x 1 =

Total CW/RTTY/PSK31 QSO's x 3 =

Total Up/Downloads x 3 =

Grand Total =

Please provide the following information:

Your Field Day Callsign

Your Group Name

ARRL Field Day Classification

ARRL Section

Power Source (Select 1)

Emergency Commercial

Your name and home call

Home address

Any Comments 



SSETI Express Update – March 2005

Graham Shirville, G3VZV, g.shirville@btinternet.com
(This article appeared in UK OSCAR News, #169, Feb. 2005)



Background

SSETI Express is the first of a series of satellites being developed by the Education Office of ESA – The European Space Agency as part of the “Student Space Exploration & Technology Initiative”.

The satellite is quite large – 600x600x700 mm and will weigh in at more than 50 kg.

It is being built by university students from a number of teams from all across Europe and being assembled at the ESA ESTEC facility in the Netherlands.

The satellite is set for launch on a Cosmos rocket later this year with a number of other satellites into a sun synchronous 98 degree, 680km orbit from Plesetsk in Russia.

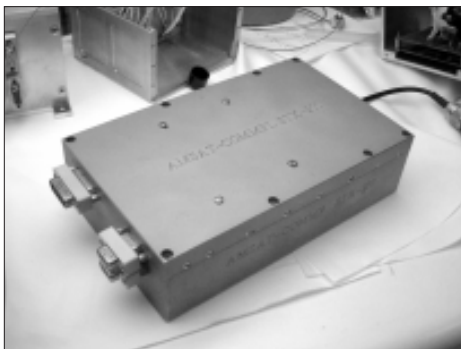
The Payloads

There is an OBC, an attitude control system, a color camera and cold gas thrusters on board as well as three cubesats which Express will “launch” soon after it separates from the launcher itself. All of these systems need to communicate with the ground both for telecommand uplink and for telemetry downlink purposes.

The Communications Suite

The main data transceiver is a UHF unit built by Holger Eckardt, DF2FQ. It is based on his existing TF7 packet transceiver but the unit includes a 9k6 TNC and has its own switch mode power supply.

Originally this was going to be the only communications device being flown but there is also a set of experimental S-band patch antennas being flown and they needed a transmitter to power them. To start with, this was also going to be a full data transceiver but the costs for a commercial unit made this option non-viable.



The S-Band unit in its enclosure.

This gave AMSAT-UK the opportunity to offer a 3 watt S-band transmitter free of charge to the project on the basis that it could be linked to the UHF receiver for operation as a single channel FM voice transponder when all the experiments have been completed. The unit also incorporates its own switchmode power supply and a 38k4 TNC to allow the rapid downlinking of data, especially necessary for the camera experiment.

The S-band Transmitter Progress

The transmitter unit is built into a beautifully machined and finished aluminium box provided by the University of Wroclaw who have also developed the three-way power splitter and the experimental patch antennas.

Except for the TNC, which is a commercial TNC 7, the whole unit has been designed and built from scratch by the team. There are five boards. The exciter from Sam, G4DDK, the PSU from David, G0MRF, the command & control board, the sensor board from Jason, G7OCD and the 3 watt PA from Charlie, G3WDG, (an identical unit to that flying in AO-51).

The unit was first delivered to ESTEC early in November 2004 but further work on the wiring was needed and it was then returned to them again at the end of the month. At this stage the first actual amateur call was put through the satellite in the clean-room from the “control room” next door.

The unit then remained at ESTEC and was regularly exercised to download data via the temporary ground station that had been provided to them by Howard, G6LVB.

During February it became clear that the data rate from the OBC to the TNC needed to be changed to accommodate other mission requirements. An AMSAT team went over to rewire and reconfigure the unit and success was quickly achieved.

We then went on to apply the conformal coating to all the PCBs (except around the RF parts). At

this stage disaster struck as the somehow some of the coating found its way right inside one of the filter assemblies – result no RF output!

The unit was then brought back to the UK for repair but quickly returned again during the first week of March by Sam and David.

They were able to demonstrate the unit working again and also helped the SSETI team solve a power limiting problem, which caused the unit to be switched off for 150ms every time it was commanded on – not helpful when trying to transmit short packets.

Here is an extract from part of the SSETI Express Integration logbook for 2 March 2005:

ESA_Neil, AMS_David and AMS_Sam power up the OBC, UHF and S-BAND for the purposes of testing.

- *The initial power consumption of S-Band FM seems good.*
- *The carrier is brought up successfully with the usual command.*
- *The DTMF telemetry is turned on and received without issue.*
- *The unit is switched to data config and data is transmitted without issue.*
- *The carrier is brought back down.*
- *The DTMF telemetry is turned on and received without issue.*
- *The unit is switched to data config and data is transmitted without issue.*
- *Transponding is tested without issue.*



The ground station.



MILESTONE 25: The S-Band sub-system is declared flight-ready.

Actually the S-band transmitter is the FIRST sub-system to be declared flight-ready!

It has been a great experience for the AMSAT-UK team to be working with both the ESA experts and also the enthusiastic students, a number of whom have expressed the intention to get an amateur license for themselves! It is a steep learning curve for them and for us although we have been



The joy of a successful baud rate change.

flattered in one presentation recently given by Neil Melville, the project manager, which includes the text "Radio amateurs know what they are talking about".

What happens next?

A total of 150 solar cells, in ten strings of 15, are currently being laid onto the external panels of the satellite and we anticipate that these should be sufficient to enable the U/S transponder to work with the carrier up on a near 24/7 basis.

The flight model of the satellite will be completed over the next few weeks and will be subjected to the usual vibration tests and also thermal vacuum tests. Hopefully these



Neil Melville, SSETI Express Project Manager, captured on the Web cam on 8 March 2005 admiring the satellite under construction in the clean room at ESTEC.

tests will be completed without incident or problem.

The launch date is still not confirmed but should be late this summer.

The SSETI team will be providing full telemetry decoding information and will be encouraging us to provide downlinked telemetry data for them from around the world. They only have two ground stations of their own available and the software does not provide the whole orbit data that we are used to. Our worldwide network is certainly a unique facility and this data collection exercise will be good PR for the amateur satellite movement. ESA will be providing a prize for the amateur who provides them with the most. Full details will be available on the SSETI Web site well before launch.

It is expected that the on board experiments should be completed within a matter of a couple of months from launch and after that the transponder can be placed into service. There is still a long way to go before that happy state becomes a reality and we have to remember that this is a high risk project – but if we don't try.....

References:

Full information about the project is available at the regularly updated www.sseti.net Web site. This includes the complete integration logbook mentioned above. It is a big file but makes very good reading for satellite enthusiasts!

The webcam: <http://sseti.gte.tuwien.ac.at/WSW4/express4.htm>

Downloads: http://sseti.gte.tuwien.ac.at/WSW4/express_downloads.htm

THE AMSAT OFFICE

The AMSAT office is located in an 8-story building at the corner of Sligo and Fenton in Silver Spring, MD. On the other three corners are a 7-11, a car repair shop and the Greyhound bus station. We have rented in this building for over 20 years. It does have free parking and is within walking distance of the Silver Spring Metro Station.

AMSAT's only employee is Martha. Her daily canine assistants are Smokey and Sadie. See the staff at <http://www.amsat.org/amsat-new/AboutAmsat/staff.php>. We also have two volunteers who come once a week.

Bill Hook, W3QBC, LM-13 became the second Treasurer of AMSAT in 1972. He was also responsible for maintaining the AMSAT mailing list. Thirty-three years later he is still helping in the membership department!

Bob Carpenter, W3OTC, was member number 26 and is now LM-21. He became Corporate Secretary for a short time in 1975. He took over donation logging in late 1991. Since then he has written the donation database and enhanced the main membership database software. His other duties include acting as the computer hardware, software and datacom guru for the Office. His gray hair recently got a lot grayer by the time Verizon finally had their DSL service to the office operational. Bob diagnosed the problem with our DSL service as a bad modem. No one thought that was possible. After many missed appointments, misdiagnoses of problem and lots of time on the telephone talking to people in California and Massachusetts it was finally concluded the modem was bad!

We here in the Silver Spring AMSAT office make an effort to keep Membership Services working smoothly. If you have any problems, you can call 301-589-6062 or send an e-mail to martha@amsat.org. Office hours are 10 AM to 6 PM (Eastern) Monday through Friday. ☎



Figure 1: Martha with her assistants Smokey and Sadie

Following are minutes from the Board of Directors meeting held in October 2004. Minutes were compiled for publication by Steve Diggs, W4EPI.

Attendees:

Robin Haighton, VE3FRH
Keith Pugh, W5IU
Dick Daniels, W4PUJ
Jim Heck, G3GWM
Stephen Diggs, W4EPI
Barry Baines, WD4ASW
Martha Saragovitz
Rick Hambly, W2GPS
Gunther Meisse, W8GSM
Tom Clark, W3IWI
Lou McFadin, W5DID
Perry Klein, W3PK
Lee McLamb, KU4OS
Drew Glassbrenner, KO4MA
Jim Sanford, WB4GCS
Pat Kilroy, N8PK
Larry Brown, W7LB
Tim Salo, AB0DO
Graham Shirville, G3VZV
Sergey Samburov, RV3DR
(Director Paul Shuch and Alternate Bruce Paige were not present)
Bill Tynan, W3XO (joined at 12:20pm)
Dan Schultz, (joined at 3:00PM)
Chuck Green, N0ADI (joined at 8 PM.)
Steve Bible, N7HPR (joined at 7 PM.)
The meeting started at 8:09 AM

Discussion Notes

The welcome was issued by Robin Haighton. Documents made available to attendees were an Agenda and a fundraising document posted by Martha Saragovitz.

Baines: Have there been any items discussed by the BOD recently that are not on the Agenda?

Organizational Structure

Haighton: Motion entertained from Rick Hambly

Hambly: A motion was made and seconded, then displayed on a projection panel. "It is proposed that the AMSAT BOD approve candidates for the following offices as Officers of AMSAT:

1. President
2. Exec VP
3. VP Operations
4. VP Engineering
5. Treasurer
6. Corp. Secretary

7. Manager
8. VP Marketing and User Services
9. VP of Human Spaceflight

This same motion dissolves any other officer positions not identified here.

Baines: Does this motion affect positions appointed by the President?

Hambly: No, it doesn't. We will discuss those later.

Baines: Are there previously appointed positions that are not on this list?

Hambly: Yes there are positions in existence that are not on this list. Those positions were created by previous Boards. This motion wipes the slate clean.

Klein: How about the government liaison position? Without an official position, it can't adequately represent the organization.

Baines: There are positions that are appointed by the board and it sounds like the government liaison position is not one of them.

Clark: I think Perry had a point that governmental affairs should be an elected position.

Hambly: There are two positions that are not proposed as "Officers" but which probably need to keep the title of Vice President. They are VP Government Relations and VP International Relations. Both are members of the Executive Vice President's team. I believe this can be managed by executive action without making these positions Officers appointed by the Board..

Baines: By creating positions elected by the Board, we are establishing them in a position where they have other individuals reporting to them and then the group can create and propose a budget to the Board.

Hambly: Any other discussions?

Meisse: I second the motion

Vote: 6 in favor, none opposed. One director was absent.

Clark: I still have concerns about the governmental affairs position.

Election of Officers

Haighton: The item is closed. Next item: Election of Officers

1. President: Rick Hambly, W2GPS. The vote was unanimous to accept.
2. Exec VP: Lee McLamb, KU4OS. Accepted by unanimous vote.
3. VP Engineering: Stan Wood, WA4NFY. Accepted by unanimous vote.

4. VP Operations: Mike Kingery, KE4AZN. Accepted by unanimous vote.
5. Treasurer: Gunther Meisse, W8GSM. Accepted by unanimous vote.
6. Secretary: Steve Diggs, W4EPI. Accepted by unanimous vote.
7. Manager: Martha Saragovitz. Accepted by unanimous vote.
8. VP Marketing and User Services: Barry Baines, WD4ASW. Accepted by unanimous vote.
9. VP Human Spaceflight: Frank Bauer, KA3HDO. Accepted by unanimous vote.

President's Report

Rick Hambly took control of the meeting, and then turned the floor over to Robin Haighton for presentation of the President's Report. The report will be submitted electronically for the Board's records.

Hambly: Thank you for an excellent job, Robin.

Saragovitz: Robin, you made so many excellent innovations. The President's Club was an excellent move for us.

Hambly: Thanks especially for the presentation at the Central States VHF Conference. The next item is the Treasurer's Report

Clark: It has been regretful that during your term, we lost 7 astronauts, and also AMSAT Life Member #3, Larry Kayser, VA3LK.

Treasurer's Report

Meisse: While I'm not an accountant by trade, I offer my services to the extent of my capabilities. The bottom line is that we were in the red approximately \$90K in 2004. We made changes this year regarding how we record assets. Based on Auditor's input, we are going to capitalize all satellite costs. This will improve the fairness of our balance sheet. The audit of our financial statements was presented.

McFadin: My concern is that our satellites are not liquid and therefore it is questionable to capitalize them.

Meisse: We took this issue to the National Accounting Board and they concurred that this was a reasonable move. We also going to start including "in-kind" contributions, including donated time by volunteers. We need to account for the hard work of the people who spend time and effort on behalf of the corporation.

Hambly: The financial picture presented is considerably better than I expected.



Meisse: By capitalizing assets, the implications are that we are showing our assets as having increased considerably. We need to explain that, while this fairly represents our position, we didn't increase our liquidity. We are reflecting that our projects are really not overhead expenses. Recording projects as overhead costs throws off the ratio of overhead to project costs in a very negative way. The name of the game is to account more effectively for "program of work" tasks, which are things we do that serve our mission statement and corporate goals.

For 2004, our Web server now has a Volunteer Reporting System ("VRS") for recording time by volunteers.

Baines: Do we have a clear understanding as to what kind of work should be recorded on the VRS?

Meisse: Our current understanding is recorded in the Volunteer section of the Web page.

As for investment review, we had a 1.66% gain through June. Our current investment balance is \$367K.

Discussion of the value of our investment advisor was held. Meisse recommended that we move our investments to SEI in Philadelphia.

The Annual Report is available in both electronic and paper format.

Hambly: Our concerns with Merrill Lynch began with the funds report we got from them earlier this year. The concerns presented are significant. The BOD has an opportunity over the next few days to show that we care about our stewardship of AMSAT's money.

Haighton: Thanks Gunther, for an excellent report!

Board Alternate Bruce Paige, KK5DO, joined the meeting at 9:15 AM.

Budget for 2005

Hambly: Robin, please present the budget for 2005.

Haighton: Each Officer was requested to submit a list of proposed expenses for 2005. Further adjustments may be made for any late entries during this Annual Meeting.

Sanford: I am trying to increase the granularity of the budget so that we can improve our planning.

Haighton: The present estimate is that we

are \$151K in the red for 2005. For the first time, our lab expenses are brought out as a non-project expense.

McFadin: With regards to the Lab, it has been closed down because the building it was in was condemned after a hurricane. Some of the Lab's equipment has been moved to Stan's and my garages. So far, we haven't been able to find a replacement facility. In the meantime, we are spending about \$298 per month for storage. I question whether we need to continue liability insurance for the lab. I think we need to add coverage for damage, not just liability.

Hambly: It looks like we are going to need to review our budget at least once every 6 months.

Haighton: After this weekend, all officers should send revisions to the Treasurer.

Saragovitz: As a point of reference, we have roughly 3300 US members, and 600 international members.

Meisse: Is it possible that by the close of this meeting, that we will have a budget that is balanced, and then vote on it before we close?

Haighton: We can try!

Clark: How many life members do we have?

Saragovitz: I'm not sure, it is probably around 2000. It is not a good situation, because we don't get much continuing revenue from them.

McFadin: With regards to the budget, I am concerned that we don't show any expenses for educational outreach. That is clearly part of our mission.

Hambly: We need to put at least \$5000 in for that item to support travel to the same conferences we attended this past year.

Haighton: I will add that, then I will work with Gunther to balance the budget.

Saragovitz: Everyone should keep in mind that the Income side of the budget does not yet show any new income initiatives.

Hambly: Along a similar line, the previous Treasurer decided to not include income from the Echo Thermometer campaign. Given its success, we can reasonably anticipate income from new funding initiatives this year.

Hambly: A vote to table budget discussions until it is revised and resubmitted tomorrow was made, seconded, and adopted.

Break at 10:05 AM.

The meeting restarted at 10:20 AM.

North American Fund Raising Feasibility Study

Meisse presented "North American Fundraising Concept Outline." A PowerPoint file version of the presentation is contained in the meeting archives.

Clark: I am trying to understand the buy-in cost number of \$30K. Your notes showed that the campaign manager then takes a percentage from the proceeds. What do we need in cash to support that subsequent take? We need to think about how we transition into this type of program.

Meisse: Once we start getting pledges, we may need to borrow against those that want to give over time. We can fund the program as we go.

Clark: Is this going to fund an endowment program?

Meisse: We need to decide if we want to do that. Some givers like pledges to "brick and mortar" projects, in which they are giving to specific project. The best people to get money from are people who have already given us money.

Clark: How about contributions from wills, if the ham population is getting all that old?

Meisse: That can fit into the program, too.

Saragovitz: I think we have only gotten will contributions maybe twice in the past 25 years.

Meisse: In creating list of potential givers, the campaign managers will go through the list of all the hams in the US, and tell us who are the most wealthy ones.

Baines: If we are going to do the "will giving" approach, we are likely going to have to do it with paid staff, rather than volunteers. This is going to be a transforming experience for AMSAT.

Haighton: There have been e-mail comments recently about being "scooped" on space/ham news items by the ARRL. That is largely due to the fact that they use paid staff, and we use volunteers. I endorse Gunther's proposal, because this is a professional approach. I make a motion to begin with this program.

Hambly: Are you making a specific proposal, Gunther?

Meisse: The decision for the Board is to decide whether we want to include the Feasibility Study cost into the 2004 Budget.

The motion was made and seconded. The vote was unanimous, with one absence (Shuch)



Clark: Maybe we should consider while we are at the Dayton Hamvention to talk to the campaign management firm in Columbus?

Meisse: Certainly; they will come to us.

Electronic Services

Hambly: We began an initiative of designing a new Web site this year, and this project has taken the more than six months and over 1000 hours of one volunteer's time. (Emily Clarke, W0EEC, specifically) The new site has been praised far and wide. Emily deserves our thanks for the time she has spent on our web site.

Klein: Do we have a visit history on the Web site?

Hambly: Yes, I believe so. Check with Emily for details.

McLamb: We need some volunteers to review the text for technical inaccuracies, spelling errors, etc.

Hambly: If anyone sees something we want to comment on, every page has a link to the site comment form. Emily did an outstanding job on this feedback system.

Clark: Is Emily the only person who is providing continuity on the structure of this site?

Hambly: Paul is backing up Emily. Emily is also training a back-up site manager.

Clark: Are we soliciting additional editors?

Hambly: Yes. Since she is using scripting (PHP), I need to talk to Emily about how additional editors can be utilized in a reasonably simple and effective method.

Now about the AMSAT online store, we had to do careful research about how our sales get processed and how the office processes orders. We have managed to come up with a sales method that doesn't have online sales fees associated with every sale. We did this by having Emily writing the store from scratch to match the existing order processing process. We now also have a store manager, Bruce Paige, KK5DO. We are in beta testing and will open the store for business soon.

Diggs: Can we take new memberships and renewals online?

Hambly: Yes, that is fully supported. We have also determined that we need more items to sell.

Clark: How are we handling security?

Hambly: The store link directs you to a commercial site that is separate from the

UCSD server. The cost is less than \$90 per year. We use 128 bit SSL for encryption, which is very good. Every time an order comes in, Martha will get an e-mail that tells her that she needs to go to the site and retrieve the order via a secure set of administrative Web pages. That way, the entire order process stays secure. Martha prints out an order form and processes the credit card charge in the office using AMSAT's existing services. That way, we pay no new online transaction charges.

Clark: Martha, are you happy with that process?

Saragovitz: Yes, I am.

Baines: How are we going to publish that fact that the store is opening back up?

Hambly: We need to advertise our online services in other publications, like QST.

Diggs: How do you feel about our base credit card processing costs?

Hambly: While I think we are paying more than we should, it isn't completely unreasonable. The Treasurer needs to keep watch on our costs in this area.

Klein: Our planned credit card service fees are \$3400 for next year.

Clark: We are also supporting PayPal also, right?

Hambly: Yes we do.

Meisse: How do we handle people who go to our Web site, join at that time, and want to immediately use members' only sections of the Web site?

Hambly: For now, they won't be able to do that. This is a manual process at its heart. There are also issues with our membership database that need to be resolved.

Baines: The store is going to be open to everyone, right?

Hambly: Yes, that is correct.

Pugh: Are we going to send order acknowledgements?

Hambly: Yes, we are going to do e-mail order acknowledgements

Klein: How about order shipment acknowledgements?

Hambly: No, not yet.

Clark: The most useful shipment acknowledgement systems are the ones that include the shipper's shipment tracking number so you can track it immediately but most of AMSAT's shipments are by mail that

have no tracking number.

McFadin: Also, the cheapest shipper I have found is using a UPS store.

Saragovitz: It isn't practical for me to leave the office, so I have limited shipping to US Mail and UPS's daily pickup.

Hambly: We have a shipping process that works today, so we are going to continue to use it for the time being.

Hambly: I want to double the number of AMSAT members over the next 5 years. To do that, we need to add value to AMSAT. Right now, non-members get almost everything for free. People then say "Why bother join? I get it all for free!" If we plan to grow our organization, we are going to have to change that situation. This isn't going to be an easy task as we may offend non-members who have supported us in other ways.

Daniels: Some of our members aren't active hams, but support us because they enjoy hearing about the work our technicians do. We may be able to grow membership by increasing the amount of technical information we make available.

Sanford: While I support making as many things open to the public as possible, we have to balance that concept with the need to add value to the membership.

Salo: We need to also look at who the broad audience for our Web site is...if it is the Press and potential contributors, we need to think about making it available to them, even though they aren't members.

Haighton: How do we handle members of other international AMSAT organizations? How do we give them access?

Hambly: Several ways...if they give us their member data, we can include them. The other approach is that their national organizations may need to independently supply certain services.

Also, because there is a growing interest in international AMSAT organizations, hams overseas are joining those organizations instead of AMSAT-NA. The question then becomes how do we respond to this decline in our revenue stream?

Saragovitz: We have lost a major share of our international members.

McFadin: Perhaps our international partners can provide a "guest" AMSAT-NA member list and we include them.



Hambly: It is likely that we may need to consider agreements between AMSAT chapters to deal with access back and forth.

Heck: AMSAT-UK uses a system where the member pays a minimum membership fee but only gets minimum services.

Shirville: AMSAT-DK (Denmark) also gave funds that were rolled into the AMSAT-UK Echo Project contribution.

Clark: Somehow we need to use our re-mailing list to advertise AMSAT. It may be our greatest resource to get the message out.

Sanford: I think closing the re-mailing list would be a major negative move.

Hambly: I propose to make AMSAT-BB subscribers also receive the ANS on a mandatory basis.

Baines: Why would the BOD even get involved in such a decision? Are we really dealing with the global question of whether we need to have member-only services?

Hambly: That sounds like a job for the VP Member Services.

Saragovitz: How are other AMSAT chapters run?

Heck: The main difference between AMSAT-NA and other AMSAT chapters is that AMSAT-NA is being run like a business. The other chapters are run like clubs.

Saragovitz: Perhaps we need to consider member and non-member prices for everything we sell.

Hambly: We will need to consult with our international partners before we make changes like what we are considering for "member services."

Heck: There may be some international hams that would be interested in joining an "AMSAT International."

Daniels: Just because we are the "parent" AMSAT organization, I'm not sure the other chapters would necessarily feel like they need to be subservient to us. If we wanted to have a real international umbrella organization, it would have to be separate.

Shirville: Even though you are AMSAT, you operate like "AMSAT North America" and that has clear international implications.

Baines: For comparison, do members of RSGB have access to the ARRL members' Web site?

Shirville: Not that I know of...

Saragovitz: How is AMSAT-NA viewed internationally?

Glassbrenner: One way of telling is watching the status of some of the international microsat projects. They seem to be languishing.

Hambly: The key is for us to establish launch opportunities. We are going to have to seriously work this effort.

McFadin: If we get satellites in orbit, we provide value to every ham, worldwide.

Lunch Break at 12:25 PM.

Returned from Break at 1:40 PM.

ITAR Discussions (closed session)

Employee Evaluation and Compensation Review (closed session)

Break began at 2:55PM.

Break ended at 3:15PM

Member Survey Presentation

Hambly: Next is Gunther's presentation of the Member Survey. A copy of the PowerPoint presentation is in the meeting archives.

Meisse: (these comments were spoken, but not part of the presentation) One idea to enhance the Journal is to put a 4-color cover around it, using the inside surfaces for advertisements.

Clark: I think the survey partially tells us that satellite hams are cheap, in the sense that they want to use the gear they already own. (e.g., the Mode B and sideband preferences)

Saragovitz: What percentage said they used AO-40?

Meisse: I believe it was 40%.

Hambly: We have a vision that we can take C-band digital voice radio and provide it to hams who can't even operate HF right now, and that we will gain members as a result. That begs the question will we lose existing members in the process of attracting new members?

Saragovitz: We also need to consider the impact on ex-AMSAT members. Can that new capability help us get those members back?

Baines: That also extends to those who subscribe to amsat-bb and have an amsat.org re-mailing address. They are highly qualified leads to become an AMSAT member, or at least a contributor. Would it be of value to survey them?

Meisse: It is going to be difficult to get useful

information out of them. The best way is to present them with a really fascinating concept. That will bring them back!

Baines: We should survey ex-AMSAT members to find out why they left.

Daniels: Perhaps we need to also present the amateur community with a technical challenge.

Meisse: We need to learn how to relate to the 20-something kids and technically challenge them.

Tynan: I think digital voice is going to be potentially interesting to the Internet oriented crowd.

Kilroy: We lose 20-somethings because of family and career challenges. 10 years later that is less of a factor and some return to AMSAT.

McFadin: Do we need a motion to survey the broad brush of amateur community?

Hambly: Gunther's presentation seemed to suggest that such a survey wouldn't help.

Baines: I think more research from the Member Services team is needed.

Clark: Whenever we see folks at hamfests, we hear "I gave you guys money and you blew it". Perhaps we can use Area Coordinators to hand out surveys at hamfests, rather than mailing them out. Another idea is to sharpen our sales pitch by the Coordinators.

Meisse: We could also do some focus groups on the CC-Rider functionality with a mock-up of the system. We could also take such a mock-up to hamfests and see how hams react to it.

Heck: One thing that attracts members is something they need for their shack that we sell.

ANS Report

McLamb: We now have four regular rotating editors of ANS. We are also using a group forwarding e-mail address. The problem is that the address is getting heavy spam. I am now filtering it before it goes to the other editors. We are also working on a Web-based workflow for the editors. This would speed up the bulletin release process. Part of the problem with scooping the Journal with ANS is that we have also inadvertently scooped ANS by sending notes to the ARRL newsletter on Fridays, before the same information goes out via ANS on Saturday or Sunday. Everyone is reminded to keep the information coming into ANS so we can



push it out to the wider world of hams.

Hambly: Can we add a copyright footnote to ANS, and can we add the results of the Officer election this weekend?

McLamb: Yes, I believe we can. The editor submits the draft text for review by the President and VP on Thursdays. They review it and it gets sent out on Saturday. Because the ANS publication date is a day later than other newsletters' information that goes out via other e-mail services (such as ARRL Newsletter) doesn't go out until the following week.

Haighton: Lee has done an excellent job of creating and coordinating a team to take care of the ANS.

McLamb: One of the lessons learned is that the team needs to be big enough to cover the comings and goings of volunteers.

McFadin: Having a bigger team also tends to prevent burnout.

Baines: Congrats on a job well done, Lee. Your team is doing an excellent job.

Meisse: We need to have ANS list hamfest booths where AMSAT will be present because it is an excellent advertisement.

Adjournment at 5:10 PM.

The group reconvened at 6:57 PM.

Field Ops Report

Barry Baines presented a status report regarding the Area Coordinators activities. Field Coordinators can now go to our Web page and update their own personal information.

McFadin: Perhaps we could have a tiered system. A State Coordinator could be responsible for training Area Coordinators.

Baines: We could give it a try.

Clark: How should we handle the situation when we have problems with an Area Coordinator?

Baines: I try to educate and "counsel" our field personnel into understanding their right to have a personal opinion vs. their role as an AMSAT volunteer. This approach works in most cases, but not all cases.

Haighton: My experience has been that when I had a problem with a Field Coordinator, it was as a result of that person having personal problems outside of our hobby.

Kilroy: Do we have a Field Ops daily digest? The Field Ops mailing list hasn't been very active recently.

Clark: Perhaps we should get Paul to set up a 48-hour summary view of messages on the Field Ops mailing list, much like the same function for AMSAT-BB.

Hambly: I have been talking to Paul about converting us from the Majordomo program to Mailman. Mailman allows the user to manage his subscriptions via a Web interface without having to wade through the antiquated Majordomo e-mail based command set..

Glassbrenner: As we encourage Area Coordinators to move from just being satellite demonstrators to being an effective "salesman" for AMSAT, perhaps they could start getting a list of hams that are up to renewal. The Area Coordinators could then follow up with these members.

Glassbrenner: Things we could add to resell are model kits. We could also use more mouse pads. "Large" shirts. We could also put together a simple Arrow-like antenna kit.

Clark: Barry, you might bring up at the Area Coordinators breakfast that AMSAT would like to do a poll like we talked about earlier today. A hamfest would be a good venue to pose that kind of question.

Glassbrenner: We could sell an Eagle book, much like we did for AO-40. Each time the Eagle team meets, the book would get a new version.

Baines: We need to finish up. The Field Ops meeting is 6:45AM Sunday.

Operations Report

Hambly: Do we have any new AO-40 information?

McFadin: We have noticed some changes in orbit that tends to indicate that we may be venting gas. It has made the orbital period longer.

Clark: Stacey said he had one unconfirmed email of someone hearing the AO-40 beacon. No other such reports have been received.

McFadin: I had a conversation with Peter Guelzow, DB2OS, of AMSAT-DL about a change in mean motion about the time AO-40 went silent. Victor Kudelka, OE1VKW, is investigating.

IARU Satellite Meeting Report

Shirville: We have coordinated 29 satellites this year; 5 are in process. An outstanding issue is the monitoring service. We are trying to get it started again, but it is going slowly. We also published a paper from Jan King,

which is in your proceedings.

Hambly: What about VUSat deciding to transmit a beacon on one of Echo's uplink (receive) frequencies? Unfortunately, our receivers are crystal controlled and are limited to two frequencies each.

Shirville: Send me the detailed information and I will investigate.

Hambly: Also, is IARU planning a meeting at our meeting this year?

Shirville: No

Klein: There used to be complaints about responsiveness. Has anything changed?

Shirville: We now respond initially the same day it comes in. Coordination may in fact take 2 or 3 weeks.

Dayton 2005

Baines: Revenue wise, we did \$3K better than last year. Our presentation facility was a bit of an issue because this year's room only had outside access, and the room entry was right beside the presenter's podium. We have been doing the same thing in the booth at Dayton for the last 10 years. We might want to consider redesigning the booth. We might to also create a new theme for the booth.

McFadin: We have been talking about a major change to our organization. I think that we need to reflect that with our booth design.

Hambly: The date for Dayton 2005 is May 20, 2005.

Haighton: Since our forum is one of the best attended, can we capitalize on it by having a double forum, i.e., make ours twice as long.

Clark: Perhaps we can invite some of the Cubesat groups to show their hardware? Either Cal Poly or Purdue would want to come. We could even have them in the booth talking about our educational outreach.

Haighton: We certainly need an update on Project Eagle every year.

McFadin: I think we should have a one page handout that we spread around the Hamvention.

Shirville: Do we have anything simple for Echo? Meaning a single sheet?

Baines: We have Gould's Echo book.

Baines: Also, we had 28 volunteers to run the booth. We could use more.

Kilroy: The AMSAT-DC meeting is also expanding. It is going to be in March of 2005.



International Report

Haighton: At the recent meeting in the UK we had NA, UK, IT, Denmark and Israel represented. DL did not make it in time for the meeting. We talked about the possibility of restarting an international organization. Interest was lukewarm. It was agreed that it wasn't sure whether some of the the smaller AMSATs really exist or not. We need to confirm their continued existence. We have only heard back from 8 different chapters.

Saragovitz: What about Junior de Castro in Brazil?

Haighton: No, I haven't heard from him. Also haven't heard from Lieberman in Mexico. We plan on meeting again next summer, and plan on inviting all of the chapters that are active.

ECHO Report

Hambly: The last report of the day is mine, which is Echo Status Report. The presentation is in my PowerPoint file in the archives.

McFadin: Based on your presentation, I still don't think we have created a situation where the users have any influence over the operation of the satellite.

Glassbrenner: I've been trying to find out who was the Echo Ops Committee, and was unable to do that.

Hambly: That was intentional. We were in a commissioning stage, and the Ops Committee wasn't intending to take the lead in that phase.

McFadin: Regardless, we needed to have published the Committee Members and give everyone a contact email address.

Hambly: We are reforming the committee under the VP Operations position.

Clark: This goes with the general concept of making AMSAT an open source organization. The committee should add a member to the organization who represents the users.

Hambly: I will instruct our new VP Operations to do that as he forms the new operations team.

The meeting was adjourned at 8:55PM.

Friday, October 8, 2004

The meeting reconvened at 8:10AM.

Jim Sanford was unable to join the meeting today due to illness.

New Attendees:

Emily Clarke, W0EEC
Lyle Johnson, KK7P

Bill Rafus, KD4FRB
Chuck Hemker, N2POR
Frank Frizone, KA2QYA
Eric Cristman, KF4OTM
Nick Pugh, K5XQJ (joined at 8:45AM)
Bob McGwier, N4HY (joined at 11:30AM)

Echo Launch Report

Chuck Green led a discussion regarding the Echo Launch Campaign.

McFadin: Did SpaceQuest do the export license?

Green: Yes, they did.

Green: The Echo Integration effort went reasonably well, thanks to SpaceQuest's expertise. Unfortunately, the SQRX device did not pass the test procedure as it was leaving the U.S. We eventually identified that it was the test plan that was defective, not the device itself. One of the lessons learned from Echo is that testing needs to have much more attention paid to the process.

Clark: Don't we have someone with ISO9000 testing certification that can manage testing for us?

Green: I'm not really familiar with who is responsible for that aspect, so I can't answer.

McFadin: Do you have a basic lessons learned document coming out of this project?

Green: Those are all included in my presentation.

Baines: Lee, have we captured any of those items?

McLamb: Yes, Chuck and I spent about 3 hours after the last Eagle Team meeting, and I captured those notes into my AO-40 Lessons Learned information.

Meisse: What would it take for us to improve our comfort factor with the space hardware we are flying?

Green: It will require the establishment of drop-dead dates for when the hardware has to be done and ready for integration testing.

Clark: One of the things we need to remember is that every satellite we build is a one-off design and construction effort.

Daniels: We need to keep in mind our history of testing, in that we have done very little.

Green: One of the problems with testing the satellite was that it physically wasn't in a location that made testing easy for anyone to test other than Jim White.

Hambly: Echo was our first satellite for

which we used a contractor for large portions of the spacecraft construction.

Clark: The Spacecraft design depended on point-to-point wiring, and that has design implications. In the future, we may want to focus more towards our CAN bus architecture we are considering for Project Eagle. We also need to budget into the project for more than one copy of each module. That way we don't have to do development and initial testing on flight hardware.

Hambly: On Echo, we couldn't afford to purchase additional modules. That is a lessons learned for our financial management plans for the future.

Eagle Status and Budget Confirmation

Hambly: A copy of Rick's presentation is included in his PowerPoint file.

Baines: Please explain the difference between the Project Manager and the Chief Technical Officer (CTO).

Hambly: It represents a division of project management and technical management. The more exotic a project gets, the less likely it will be that any one person can be good at both functions. We have been very fortunate to get Jim Sanford to volunteer to manage the project, but he had reservations about managing the technology aspect too. That is why we split the responsibilities.

Klein: Does the CTO need to be in Florida

Hambly: No, absolutely not.

Orbital Debris Report

Clark: Do we know anything about what satellite builders are doing in other countries with regards to minimizing orbital debris?

Hambly: It seems that the U.S. is unique in its considerable interest in the issue. On the other hand, the U.S. is often looked at as the leader in such regulatory issues, so what happening here may become the model for other countries.

Clark: Isn't de-orbit capability a big part of this issue?

Hambly: Not necessarily. Moving to parking orbits is an alternative.

Dick Daniels' Recent Trip to AMSAT-DL

Daniels: I visited the antenna facility in Bochum, Germany, which is near Cologne. A 10 minute break was taken at 10:10AM. The meeting reconvened at 10:35AM.



SimSat Proposal Discussion

Pat Kilroy, N8PK, gave us a brief presentation on the balloon project called SimSat. Pat's SimSat program is described in an email item dated 10/6/04 to the BOD mailing list.

Kilroy: Check out <http://www.patkilroy.com/simsat>.

Hambly: Pat needs to work with Lee McLamb, who is our Executive VP whose team is responsible for education outreach projects and put the SimSat proposal into a more concrete format.

ARISS Report

Frank Bauer, KA3HDO, presented the ARISS status.

Education Report

Lee McLamb discussed his attendance at the Small Satellite Conference this summer. Lee also discussed his attendance at the Rideshare Conference in Alaska this year. There is an opportunity for small satellite launches on NRO missions.

AGM and Symposium for 2005

Nick Pugh, K5XQJ, gave a presentation on his proposal to host the 2005 AGM in Lafayette, Louisiana. The population is approximately 100K. Baton Rouge is one hour east. New Orleans is about two hours away by car.

McFadin: How much local help do you have?

Pugh: I am looking to have a local club sponsor the meeting and help me. I haven't picked a hotel yet.

Clark: How about local educational involvement?

Pugh: We have a CubeSat project going at the local community college and I am working to get them involved in the conference.

A motion was made, seconded, and accepted unanimously to have the meeting in Lafayette, LA next year. The date was not established at that time.

Budget – Finalize

Haighton: A revised budget has been prepared. A copy of the spreadsheet is contained in the meeting archives. The proposed budget has a \$7K surplus.

McFadin: Does this under-fund the Eagle Project?

Haighton: It funds everything that the Project Manager proposed.

McFadin: But aren't there a lot of Eagle cost lines that have zeros in them? Doesn't that relate to under-funding the Project?

Hambly: The budget is based on the best information available. The budget for Eagle is definitely light, but we have to start somewhere.

A motion was made by Hambly to accept this balanced budget proposal, seconded by McFadin, and was unanimously accepted. (one absence)

Ata-boys and Girls

Haighton: Nominations for Atta-boys?

Clark: Tynan, Soifer, Klein, Feller and Imlay for the work they do to keep us ahead of the curve on regulatory issues.

Haighton: Emily Clarke for work done on the web site, also for AMSAT-UK for their contributions to the Echo Launch funding campaign, and for building an S-Band PA at the end of the project.

McFadin: Frank Bauer for all of the work he has done on ARISS and hosting this meeting.

Clark: I would also add for hosting this meeting Janice Bauer, Elaine Hambly, Elizabeth Clark, and Jackie Daniels.

Saragovitz: Jean Davies for donating the time to make the AMSAT pins.

Baines: To Gould Smith for his work done on the Echo book.

Clark: Mike Kingery and Jim White for making Echo work. To Chuck Green for being away from home for many weeks to get Echo launched.

Haighton: To Gunther Meisse for the Member Survey work, plus the Annual Report, and for taking over as Treasurer.

Haighton: Martha Saragovitz for the work she has done for advising the President over the last two years.

Clark: To Alliance Healthcard, Inc. and Steve Diggs for the excellent teleconference services. This has saved us thousands of dollars.

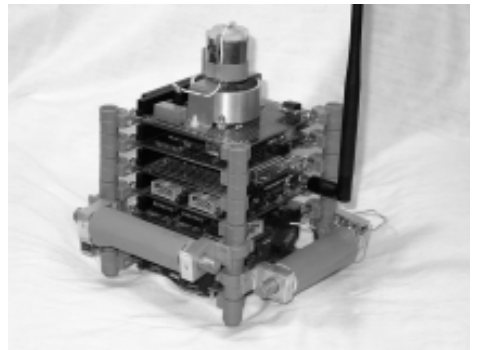
Clark: To Gerald Youngblood for his continued interest in AMSAT and software-defined radios.

Clark: To Bruce Paige for his work as AMSAT online Store Manager.

Motion to close the meeting at 12:15PM was moved, seconded, and passed unanimously.



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Some more Kid's Day participants.



Ed,

Thought you might like to put these pictures in the next *Journal*. They were received after the Kid's Day article was done.

At left is Julia, Age 9 and right is Katie, Age 6. Both are Jeff's, KA8HQL, daughters and made contacts during Kid's Day.

Mike Kingery, KE4AZN



